

UNIVERSITY OF NOTTINGHAM

Department of Archaeology

ON FOOD AND FODDER:

Archaeobotanical Investigations of Bamburgh Castle's West Ward,

9th through 12th centuries



by

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Declaration of Originality

I certify that:

- a) The following dissertation is my own original work.
- b) The source of all non-original material is clearly indicated.
- c) All material presented by me for other modules is clearly indicated.
- d) All assistance received has been acknowledged.

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ABSTRACT

Herein lies the culmination of the identification, analysis and interpretation of archaeobotanical remains from nineteen contexts sampled from Bamburgh Castle's West Ward. This study explores samples spanning the 8th through 13th centuries at the fortress. The interpretation of an early medieval grain-drying kiln is central to this report. The kiln is compared, both structurally and macrobotanically, to a selection of roughly contemporary kilns across Britain. This feature, and especially the charred plant remains preserved within, provide valuable evidence toward at least small-scale crop-processing activities at Bamburgh Castle during the Early Medieval period.

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ABBREVIATIONS USED IN THIS TEXT

BRP: Bamburgh Research Project

Fox: Tom Fox, Bamburgh Research Project

Pers. Comm.: Personal communication

RCHAMS: Royal Commission on the Ancient and Historical Monuments of Scotland

Young: Graeme Young, Bamburgh Research Project, Director

1. INTRODUCTION

This study explores the Anglo-Saxon to Anglo-Norman periods at Bamburgh Castle, a site of historical and legendary prominence, central to the reigns of Northumbrian kings and earls, through archaeobotany. Through the identification, analysis and interpretation of plant remains dating mainly from the 9th through 12th centuries, this study addresses research questions relating to the nature of production and consumption on this rural, high-status, secular site. Bamburgh's role in its economic network with regard to crop-processing and the centralization and redistribution of cereal resources is examined. The influence of the castle's northern location and the impact of the Norman Conquest on accessibility to plant food resources and culinary preferences at Bamburgh are also considered.

The samples studied for this project were collected from three trenches within the West Ward of the fortress (mainly Trenches 1 and 3 but also one sample from Trench 8), a region of the site that is largely characterized by industrial activity. This is the largest archaeobotanical investigation of Bamburgh Castle's West Ward to date, wherein twenty samples (nineteen contexts) are analysed, building on the studies of Huntley and Coutu in 2007, having reported on five West Ward contexts each, respectively. The current study features a much more extensive exploration of the Late Saxon period at Bamburgh than has previously been made archaeobotanically.

1.1 Site Description

Bamburgh Castle, located on the northeastern coast of Northumberland on a site boasting thousands of years of occupation, played an important role in the governance of

what is now Northern England and Southern Scotland for hundreds of years.

Overlooking the North Sea, the castle is approximately 20 miles south of the mouth of the River Tweed and 55 miles north of the mouth of the River Tyne (Google Maps 2017). The castle is situated on a natural 3.3-hectare plateau of dolerite rock, sitting up to 30 meters above the surrounding landscape (Young 2003, 6). The site is located in close proximity to the monastery at Lindisfarne, to which the castle maintained close social and economic ties during the Anglo-Saxon period. The current castle fortification is largely the product of late 19th-century reconstruction but retains some of its medieval structure. Surviving medieval structural elements include much of the stonework from the original 12th-century donjon and the Inner Ward curtain wall, including its 12th-century square towers on the north and south sides (Young 2003, 32-34). Oswald's Gate served as one of the main historical entrances to the castle from the 8th century onward and although subject to various reconstructions, 12th-century material does remain a part of the current structure (Young 2003, 31).



Figure 1: Location of Bamburgh Castle (Google Maps 2017)

1.2 The Role of Bamburgh Castle Today

Thanks to its long, rich history, Bamburgh Castle maintains an important role in society today, continuing to inspire the imaginations of tourists, writers and artists (e.g. BBC 2010). From Thomas Malory's attribution of the castle to the fortress of Dolorous/Joyous Garde featuring in Lancelot's escapades, to Bernard Cornwell's novels *The Saxon Stories*, Bamburgh Castle is given a place in stories both old and new (Moll 2005). The fortress was used to set films such as *Becket* (1964) and *Macbeth* (1971), reaching international audiences. The archaeology of the castle has also received international interest through television programmes such as *Time Team* and popular archaeology publications such as *Archaeology Magazine* (Time Team Special 2011; Powell 2016).

Through the efforts of the Bamburgh Research Project, the castle has become a place for archaeological education during a yearly field-school. The castle, currently owned by Francis Watson Armstrong, is also open to visitors nearly all year round (Bamburgh Castle 2017). Although extensive scholarly research has been aimed at understanding Bamburgh's past, gaps still remain in its narrative to intrigue historians and archaeologists.

2. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Historical Overview: Anglo-Saxon to Anglo-Norman Periods

The Anglo-Saxon Chronicle reports the building of a fortified centre at Bamburgh by Ida, "from whom the royal family of Northumbria first originated", in 547, "which was first enclosed by a stockade and thereafter by a wall" (Swanton 1996, 17). The site

remained the seat of Northumbrian kings between the 7th and 9th centuries, until the southern portion of Northumbria (roughly the former province of Deira) came under Scandinavian rule in 867 (Yorke 1990, 97). Bamburgh Castle served both as a place of residence for the kings and their households and as a royal administrative centre (Kirton and Young 2016). Textual information for 9th-century Northumbria is somewhat sparse, however it is clear that Northumbrian kings continued to rule over the northern portion, north of the Tees River, until King Aldred submitted himself and his kingdom to the royal authority of Aethelstan, King of England, in 927 (Yorke 1990, 72, 95-97). It has been noted that although the rulers of Bamburgh after this submission were called ealdormen, the power retained by these individuals within Northumbria was significantly greater than that of ealdormen elsewhere in England (Williams 2007, 6; Yorke 1990, 97). Yorke (1990, 97) suggests that as far as Northumbrians were concerned, these ealdormen may have been considered more like regional kings. The local ealdormen were replaced by Norman aristocrats by the late 11th century (Rollason 2003, 249). In 1095, the Norman Earl of Northumbria, Robert de Mowbray, rebelled against King William II, resulting in Robert's capture by the English crown and the besieging of Bamburgh Castle (Kapelle 1979, 155). Robert's wife eventually surrendered the castle to William II, upon a threat to Robert's life (Kapelle 1979, 155). Once in royal possession, Bamburgh castle would have received occasional visits from the royal family and retinue but did not serve as a main royal residence (Young 2003, 45-46). Bamburgh was then governed by officials, or 'sheriffs', under crown rule. Documentary sources such as writs demonstrate that during the reign of King Henry I (1100-1135), native Northumbrians were selected as sheriffs (Kapelle 1979, 156, 200-

202). With the discontinuation of the earldom of Northumbria, the political pre-eminence of Bamburgh was greatly lessened, as its power was no longer necessitated by Scottish threat (Kappelle 1979, 155-156). At the end of the 11th century, William Rufus had established his nephew Edgar as a king in Scotland, resulting in decades of peace between the Scots and Northumbria (Kappelle 1979, 157).

2.2 On Church and State

Throughout the Anglo-Saxon period, Bamburgh Castle, and its keepers, held important social and political ties to centres of ecclesiastical power – the monasteries of Iona and Lindisfarne in particular. Oswald, the famous 7th-century King of Northumbria and later saint was adored in the region long after his death (Coutu 2007). Oswald had spent time in exile at the monastery of Iona and formed ties there (Coutu 2007). King Oswald connected Bamburgh to the Irish Christian tradition in establishing the monastery at Lindisfarne, affiliating the ecclesiastical centre with his own secular centre, comparable to the ties between Dunadd and Iona (see Campbell 1987). As a result of King Oswald's connection to the Irish monastic community, founding Lindisfarne with Aidan, an Irish bishop, northern Northumbrians initially adopted Irish rather than Roman Christian traditions (Higham 1993). Monasteries served as the most important episcopal centres in Northumbria, unlike in Mercia where the power of cathedral churches was emphasized (Higham 1993, pg. 150). These customs changed however, at least formally, with the Synod of Whitby in 664 (Loveluck 2013, 170-171). Oswald also founded a church at Bamburgh and was the first king to encourage Christianity in the region (Coutu 2007). Ties between Bamburgh and the Church continued long after Oswald's time. There are accounts of 8th century Northumbrian

kings abdicating and retiring into monasteries (Yorke 1990, 87; Higham 1993, 153-4). High-ranking individuals in religious communities, for example abbots, could maintain some political sway and continue to enjoy comfortable, if not lavish, lifestyles (Higham 1993, 153-4). During the early 9th century, King Eardwulf of Northumbria married into the family of the Holy Roman Emperor Charlemagne, strengthening Northumbrian ties to the Church (Higham 1993, 149). After Eardwulf's expulsion from Northumbria around 806 C.E., he received assistance not only from Charlemagne but also from the pope himself in returning to his homeland (Yorke 1990, 96). Kirton and Young (2016, 149) suggest that Bamburgh may have had a more significant ecclesiastical role than has yet been understood. It is increasingly accepted that there is some ambiguity in differentiating between sites of religious and secular power over the Anglo-Saxon period. High-status Anglo-Saxon sites such as Brandon, Flixborough and Northampton have been variably interpreted as either ecclesiastical or secular centres, or as alternating between the two over time (Blair 2005 204-2012). A large, central, timber hall at Northampton, replaced by a yet larger stone hall in the 9th century, was initially understood to be a royal hall – much as would have been found at Bamburgh (Blair 2005, 205). The hall at Northampton has since been interpreted as a refectory at the centre of an ecclesiastical site, given the monastic associations of the surrounding evidence (Blair 2005, 205). Although Bamburgh's secular function is not disputed, the presence of a mortar mixer and evidence of stone buildings on the site demonstrates the royal adoption of traditionally ecclesiastical technologies, though it is unclear as to whether the castle's stone buildings were for secular or ecclesiastical functions – or both (Kirton and Young 2012). This sharing of technology and skills, perhaps even workers,

is indicative of the confluence that may have existed between Bamburgh Castle and ecclesiastical centres such as Lindisfarne. The presence of a church within the castle's Inner Ward from the mid-7th century, dedicated to St. Peter, also speaks to Bamburgh's ecclesiastical role (Groves 2010, 124-125).

2.3 Life at Bamburgh Castle

Documentary and archaeological evidence has helped to shed light on the nature of every-day activities at Bamburgh Castle. Analysis of the archaeological evidence from throughout the medieval phases at Bamburgh, in comparison with available evidence across Britain, has led scholars to interpret this site primarily as one of consumption. This consumption was likely supported by estate centres, such as Yeavering, where goods were collected for transportation to Bamburgh and Dunbar as well (Loveluck 2013, 144). Archaeological evidence demonstrating stone-working, high-status animal-consumption, such as of deer and crane, and the presence of high-craftsmanship metalwork are indicative of an emphasis on conspicuous consumption activities at the site (Kirton and young 2016, Albarella and Thomas 2002; Loveluck 2013, 145). According to archaeological evidence, this nature of high-status consumption is shared by the northern British sites of Dunadd, Dunbar, Edinburgh and Flixborough (Loveluck 2013, 145). However, there is also considerable evidence for production activities at Bamburgh, including an industrial metal-working area in the West Ward and a grain-drying kiln near Oswald's Gate (see below). Quern stone fragments and extensive evidence of animal butchery also point to Bamburgh's role as a centre for industry and food processing (Groves 2010, 125).

There is considerable evidence to suggest that life at Bamburgh was affected by international influences as early as the Anglo-Saxon period. It has been suggested, based on artefactual trading evidence such as pottery, that Northumbria may have had stronger links to continental Europe during much of the Anglo-Saxon period than it did to Southern England (Ferguson 2012, 296). There were, for example, notable connections between Bamburgh and the Carolingian empire of continental Europe. During the 9th century, King Eardwulf of Northumbria reportedly married a (possibly illegitimate) daughter of Charlemagne in order to gain political support from overseas (Yorke 1990, 96). Experimental archaeology and calculations based on the sea-faring technologies of early medieval northwestern Europe have estimated that early medieval trading vessels could have travelled from Bamburgh to Francia in just over 4 days (50 hours of sailing at 7 knots, assuming 12-hour days) (Ferguson 2012, 294). Archaeological studies indicate that these vessels were capable of versatile navigation across open waters, coastal areas and inland waterways, which would have increased accessibility for trading (Ferguson 2012). Bamburgh and Lindisfarne would have been well-suited as stops for trading vessels, though there is no direct evidence for such activities as of yet (Ferguson 2012).

Bamburgh's religious connection to Ireland with Bishop Aidan and the community of Iona's role in Northumbria's conversion is another example of external influence. The famous whalebone "Frank's Casket" is thought to have been produced in Northumbria and is a material example of the region's diverse connections during the Anglo-Saxon period (British Museum n.d.). This extraordinary 8th-century artifact demonstrates the influences of Germanic, Roman, Jewish and Christian traditions

(British Museum n.d.). There is also evidence of Northumbrian exposure to the Muslim world, largely as a result of religious pilgrimages. *De Locis Sanctis* is an account of a Gaulish man's adventures during his pilgrimage to Jerusalem, recorded originally by Adomnan of Iona. The Venerable Bede copied this account and the work was presented to King Aldfrith of Northumbria sometime during the late 7th to early 8th century. The account was afterward distributed to a wider audience (Beckett *et al.* 2003, 44-69). There is also an account, written by Hygeburg, an Anglo-Saxon nun, of an Anglo-Saxon pilgrim named Willibald travelling to Rome and Jerusalem between 723 and 727. Hygeburg met Willibald in Germany during his return voyage and he recounted his interactions with the local Muslim populations during his pilgrimage (Beckett *et al.* 2003, 44-69). Archaeological and textual evidence of trade between the eastern world and other parts of England have been recorded as well (Beckett *et al.* 2003, 44-69).

Fascinating evidence for cross-cultural exposure at Bamburgh has been found archaeologically at the site itself. A study of the 7th-8th-century human remains at the Bowl Hole cemetery has revealed the presence of international occupants, or at least visitors, at the castle during the Anglo-Saxon period. Isotopic analysis suggests that some individuals buried in the Bowl Hole had spent formative years in Scandinavia, North Africa and the Southern Mediterranean (Groves *et al.* 2013). Approximately half of the individuals analyzed grew up in the immediate vicinity of Bamburgh (Groves 2010, 125). The individuals buried in the cemetery ranged from neonates to the elderly and those so far analyzed consisted of approximately equal numbers of male and female adults (Groves 2010, 120-121). The cemetery does however extend further than what has so far been excavated (Groves 2010).

2.4 Introduction to the Archaeology of the Site

The archaeological remains at Bamburgh are divided into two distinct, though related, sites: the Castle and the ‘Bowl Hole’ cemetery, associated with 7th to 9th-century occupation at the castle. The cemetery, containing over 100 men, women and children, is located to the south of the castle (Kirton and Young 2016, 153). The Bowl Hole, although fascinating in its own right, is not investigated as part of this study due to the scarcity of archaeobotanical evidence recovered there (Huntley 2007). The focus here therefore lies on the castle site (Figure 2). Archaeological excavations at Bamburgh Castle began in the early 1960s and 1970s under the direction of Brian Hope-Taylor, whose findings were unfortunately never published (Andrews 2016, Young 2003, 1). Hope-Taylor reported having found archaeological evidence of the site’s continuous occupation from the “pre-Roman period” through the Middle Ages (Hope-Taylor 1977:370). The Bamburgh Research Project (BRP), directed by Graeme Young, resumed excavations at the site in 1998 (Kirton and Young 2016, 151). After locating and back-tracking through Hope-Taylor’s excavations, the BRP confirmed that those initial excavations had reached Iron Age levels of occupation (Young 2003, 1; Young n.d.). A period of abandonment appears to have followed the Iron Age activities at the site but occupation may have been continuous from the fifth century through to the modern period, though such continuity has yet to be proven archaeologically between the Romano-British period and the 6th century (Kirton and Young 2016). As of the 2016 field-season, The BRP’s excavations were exploring layers of occupation as early as the 8th-9th century (Graeme Young, personal communication 2016; Kirton and Young 2016). The BRP has so far explored two main areas within the fortified centre

archaeologically: the Inner Ward (see Kirton and Young 2016) and the West Ward (see Figure 1). This study investigates environmental samples from the West Ward: mainly Trenches 1 and 3. Trench 3 is currently being interpreted as a metal-work production area while Trench 1 sits at Oswald's Gate, which served as an entrance to the fortress (Kirton and Young 2016, 152-153).

Excavation of the Inner Ward has been less extensive, focusing mainly on the location of the 12th-century chapel. Textual sources suggest the presence of a church within the fortress grounds during the early medieval period and although this has yet to be located archaeologically, it is hinted at by the remains of a stone building beneath the 12th-century chapel (Kirton and Young 2016).

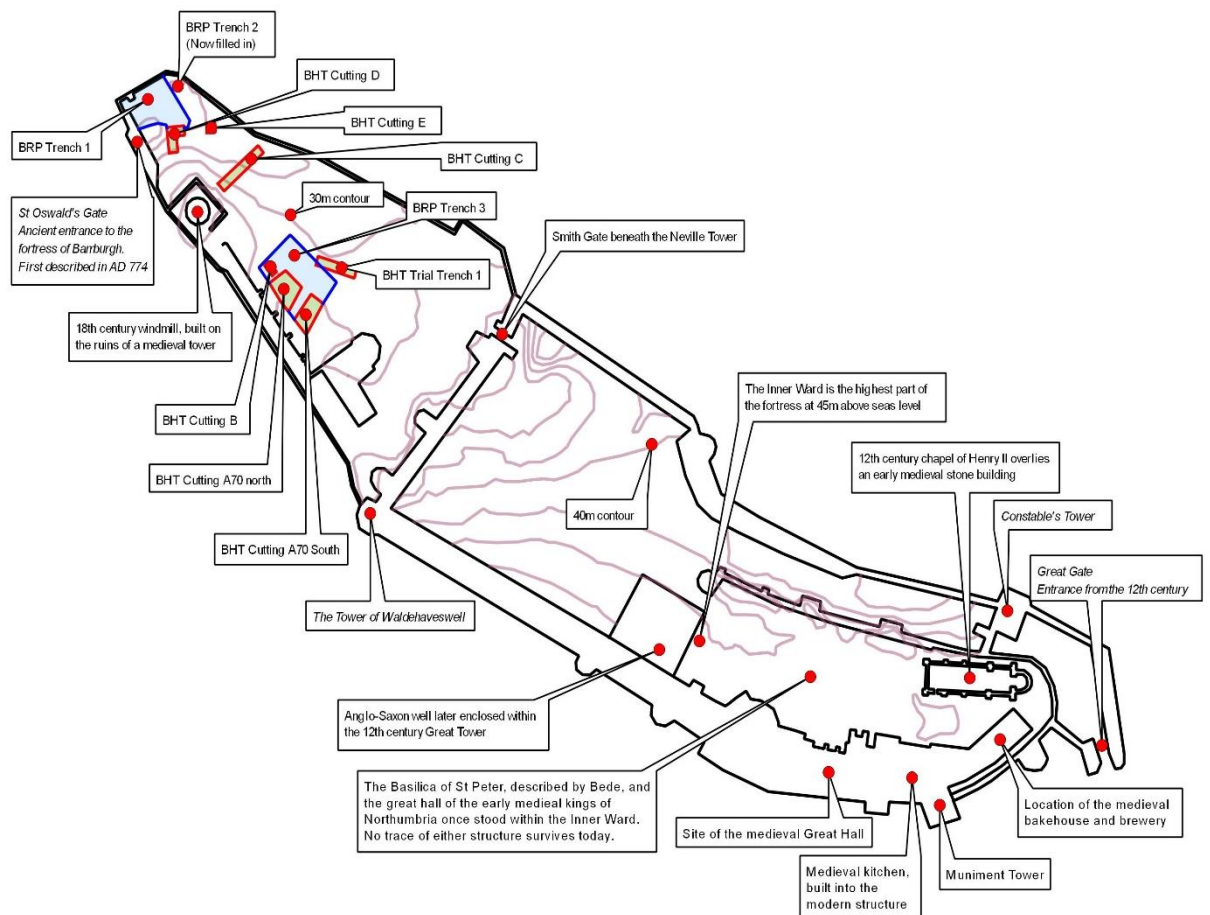


Figure 2: Map of Bamburgh Castle Site, demonstrating key features and areas of archaeological investigation. Courtesy of BRP Director Graeme Young.

The medieval Inner Ward, much like today, housed most of the castle's main buildings, the ruins of which were described and recorded by antiquarian Cadwallader John Bates in the 1890s (Young 2003 28-30). The High Medieval bakehouse and brewhouse of the Inner Ward are now located underneath a modern apartment. This area also included storerooms, a buttery, the great hall and a kitchen, the latter of which forms part of the current Museum Room (Kirton and Young 2016, 155-157). Although of particular interest for environmental sampling, the modern use of these areas makes them currently inaccessible to archaeological investigation. The fortification of the castle underwent several changes over the course of the Middle Ages before its destruction by cannon-fire in 1464, followed by its reconstruction for Lord Armstrong in the 1890s (Brown 1954, 129; Young 2003, 1).

To date, several important Anglo-Saxon artifacts have been unearthed at Bamburgh Castle. Perhaps the most famous of these is the so-called "Bamburgh Beast", a 7th-century zoomorphic detail adorning a small gold mount discovered during Hope-Taylor's excavations (RCAHMS, SC 767871). Similar pieces have been unearthed under BRP investigations as well (Bamburgh Research Project Blog 2010, Sept. 5). Hope-Taylor also discovered two Anglo-Saxon swords at Bamburgh, drawing particular attention given the intricate pattern-welding technique used to produce them: the blades were forged using four and six strands of iron respectively (Young 2007; Andrews 2016). Such advanced technology is indicative of a very wealthy patron (Young 2007). The complexity of pattern-welding that characterises the six-stranded sword has rarely

been found archaeologically across Europe, let alone the British Isles (Young 2007). The swords are thought to have been associated with a large, stone-founded timber building used for metalworking in the West Ward – possibly for the manufacture of weapons (Young 2007). This metal-working area may have been used as such from the middle Saxon period through the 9th century (Young 2015). Hundreds of 9th-century *styca* coins from the West Ward have also provided insights into economy and status, as well as valuable dating information (Young 2003, 17). One hoard of seventy-seven, mostly copper, coins uncovered on the floor layer of the timber building in Trench 3 was composed mainly of *stycas* from the reign of King Ethelred II, c.840-848, but also included coins of Archbishop Wigmund of York (c.837-854) and possibly King Osberht (c.848-867) (Castling and Young 2011). Fragments of a carved stone chair, discovered during gardening work at Bamburgh during the 19th century, have been identified and dated to the 9th century by Rosemary Cramp. The seat is reminiscent of royal or ecclesiastical thrones and would have been comparable to stone chairs known from contemporary ecclesiastical sites, such as Hexam and Beverly, but is an unprecedented find on a secular site in the region (Cramp, R. 1977, 9; Young 2003, 17). Other interesting finds from Bamburgh include colourful Anglo-Saxon glass beads, spindle whorls (at least one of which is dated to the 13th-century), and a late Saxon bone comb (RCAHMS n.d.). Understanding of the chronology at Bamburgh has been aided by the discovery of *stycas* in the West Ward, ceramic finds such as medieval ‘Bamburgh Ware’ (thought to be 12th-century but certainly between the 11th and 13th centuries) throughout the site (see Kirton and Young 2016, 179 for a description of Bamburgh Ware) and radio-carbon dates in the Inner Ward (Young 2016, personal comm.; Kirton and Young

2016). Trench 3 in the West Ward is, as of 2017, stratigraphically the best-understood of the areas so far explored (Young 2016, personal communication).

A number of Anglo-Saxon features have also been identified. Early medieval stone-working was practiced on-site at Bamburgh, as evidenced by an early 8th- to early 9th-century mortar-mixer (Kirton and Young 2012). The remains of early medieval stone buildings, alongside the mortar-mixer, are testament to the wealth and power of the site's occupants (Kirton and Young 2012; also see Kirton and Young 2016). Mortar-mixers are rare finds among Anglo-Saxon secular sites, as are stone buildings which are more frequently observed on ecclesiastical sites (Perry 2000, 73-74). Most contemporary Anglo-Saxon halls, even royal halls, were timber structures (Kirton and Young 2012). Timber structures were also used at Bamburgh. For example, a timber building has been associated with the metalworking area identified in Trench 3 (Castling and Young 2011). Roughly contemporary Northumbrian mortar-mixers were found at Dunbar Castle and the monastery of Monkwearmouth (Perry 2000, Cramp 2006.) Five 8th-9th-century examples have also been found at Northampton (Loveluck 2013, 145; Perry 2000, 73). Eynsham Abbey and St. Peter's Church Wallingford too provide southern examples of Early Medieval mortar-mixers (Kirton and Young 2012). The excavation of a late Anglo-Saxon grain-drying kiln in the Oswald's Gate region, Trench 1, was completed during the summer of 2016 (Young 2016, personal communication). Archaeomagnetic dating of the kiln provided a series of date ranges spanning 950 B.C.E. to 1572 C.E. (Clelland and Batt 2008). Stratigraphically, the kiln is thought likely to date to between the 9th to 11th centuries C.E. (Young, pers. comm. 2016). This feature, yielding the greatest density of plant remains recovered at Bamburgh so far, is

central to this study. Interpretation of its contents will take place below, in the Analysis and Discussion sections.

The Anglo-Norman and later periods of the castle have perhaps received less attention than the Anglo-Saxon period, possibly due to the site's decreasing political pre-eminence after the Anglo-Saxon period. The period between the 9th and 12th centuries is a poorly-understood section of Northumberland's history and archaeology; in the castle's West Ward this period was represented by relatively shallow deposition (20-30cm), which may be indicative of a decrease in activity over the period (Young 2015). However, what seems to have been a large, "ground-standing" timber building on stone slabs has been identified in this depositional section and may date to the 10th century (Young 2015). Between the 12th and 15th centuries the excavated portion, at least, of Bamburgh's West Ward was used as a midden (Young 2015).

Comparison to the excavations of fortified sites in southern Scotland, particularly Dunbar Castle, is helpful to the interpretation of Bamburgh Castle's archaeology (Kirton and Young 2016; Kirton and Young 2012). The castle site at Dunbar has an analogous occupation history to that of Bamburgh, having been occupied during the Iron Age, developing into an Anglo-Saxon centre of wealth and status after a period of abandonment, experiencing various changes in status and identity over the Anglo-Norman and late medieval periods and suffering eventual destruction in the latter half of the 15th century (Loveluck 2013, 144; Perry 2000; Brown 1954, 44; Kirton and Young 2016, 149). Textual evidence, such as that provided by Bede and Eddius Stephanus, describe Bamburgh, Dunbar and possibly Edinburgh as *urbs* (Perry 2000, 7). Although interpreting this term is far from straightforward, the shared description does

demonstrate a perceived link in the character of these three sites. Bamburgh and Dunbar are both located near the sea, and both associated with nearby ecclesiastical sites: Lindisfarne and Tynninghame, respectively (Perry 2000, 317, 320-321). Perry (2000, 317) suggests that the two royal centres may have held similar political, economic and social functions. Textual sources identify both Bamburgh and Dunbar as centres for dispensing justice and containing prisoners. In 750 King Eadberht removed Bishop Cynewulf from his station at Lindisfarne and imprisoned him at the fortress (Higham 1993, 148). Dunbar was used similarly to lock away St. Wilfrid at the behest of King Ecgfrith of Northumbria (Loveluck 2002, 138). Archaeological excavations at Dunbar have revealed a 9th-century mortar-mixer and stone buildings, ornamental gold, 9th-century *stycas* and evidence of Anglo-Saxon on-site metal-working, all of which have also been found at Bamburgh (Perry 2000). Archaeological evidence supports the function of Dunbar as akin to that of a shire centre: Dunbar likely had a royal hall, surrounded by smaller ancillary buildings, and harboured a diversity of industrial craft-working; Dunbar also received food renders from surrounding lands to supply the king and his household (Perry 2000 319, 320). A similar economic structure is being pieced together through the archaeology of Bamburgh Castle.

2.5 Previous Archaeobotanical Studies of Bamburgh's West Ward

Flotation and the collection of archaeobotanical samples at Bamburgh Castle began in 2006 (Coutu 2007, 24). In 2007 Huntley completed an initial assessment of the preservation of macrobotanical remains from Saxon and medieval deposits (Huntley 2007). Huntley's study included five samples from the castle site and one from the Bowl Hole burial site. The scarcity of identifiable remains from the Bowl Hole led Huntley to

discourage further macrobotanical analysis of the burial area (Huntley 2007, 6). From the castle site, Huntley examined one Middle to Late Saxon context, one Late Saxon to early Norman (both from Trench 1) and three 13th-century contexts (from Trench 3). The 13th-century samples were the richest in macrobotanical remains, with the highest sample yield totalling 174 seeds (Huntley 2007, 4: Table 1). The 13th-century samples also exhibited wild seed specimens which were absent in the earlier samples (Huntley 2007, 4: Table 1). The majority of identified cereal grains were collected from a context identified as a 13th-century hearth (Huntley 2007:2). Bread wheat (*Triticum aestivo-compactum*) was the most commonly occurring species both within this sample (94 specimens) and across Huntley's assemblage (129 in total). Oat and barley were nearly equal in representation with 32 barley and 40 oat specimens in total, again concentrated in samples dating to the 13th century. The abovementioned 13th-century hearth context also uniquely included four lentils, a species meriting particular attention because it is not native to England. Huntley suggests that lentil may have been imported to the castle (Huntley 2007, 4-5). Faith and Banham have recently noted however that medieval occurrences of lentil throughout the country appear especially between the 9th and 13th centuries, during the medieval warm period, when rising temperatures may have allowed for the cultivation of lentil in some parts of England (Banham and Faith 2014, 34). Moffett suggests that lentil may have been grown for fodder during the Anglo-Saxon period, as it was in post-medieval England (2012, 352). The samples examined by Huntley from the Saxon period yielded very few seed specimens (no more than 15 identifiable seeds per sample) and those identified were poorly preserved (Huntley 2007, 4, 6). Overall, Huntley's examination found evidence of cereal consumption in keeping

with what would be expected at a high-status site, following the current understanding of relative importance of cereal species in medieval England: with bread wheat being the dominant crop, followed by barley (Banham and Faith 2014, 24-25). Huntley also noted the presence of seaweed throughout the Saxon and medieval contexts, associating it with use as fuel or fertilizer, though Hagen comments on the likelihood of seaweed being a part of the Anglo-Saxon diet, particularly on coastal sites (Huntley 2007, 6; Hagen 1995, 42). Huntley also identified wheat culm nodes in one 13th-century post-hole context, suggesting the presence of thatched roof on the associated building (Huntley 2007, 5). Huntley recommended further exploration of the macrobotanical remains from Bamburgh Castle, particularly in 13th-century contexts 3117 and 3119 which she estimated had the potential to yield statistically significant seed counts (Huntley 2007, 6).

Also in 2007, Coutu conducted an analysis of the castle's macrobotanical remains from 12th- to 14th-century contexts. Through an examination of five samples, Coutu sought to discover whether archaeobotanical analysis would demonstrate differential use of space between the central West Ward (Trenches 3 and 8) and Oswald's Gate (Trench 1) areas of the castle, with regard to production and consumption activities. Her study tested a developing hypothesis based on artefactual and documentary evidence that the Trench 3 was predominantly a production area while mainly consumption activities took place near Oswald's Gate (Coutu 2007). To address this question, Coutu considered the ratios of wild to cultivated seeds in each sample as well as the amount of chaff remains observed. The assemblage under study included three samples from the Oswald's Gate area, Trench 1, one from Trench 3 and one from Trench 8 (Coutu 2007, 24). All three

Oswald Gate samples contained evidence of metal-working alongside the botanical remains (Coutu 2007, 34, 49). Cereal grains comprised the majority of preserved specimens in each sample examined. The sample collected from what was identified as a 12th-century post-hole (context 1098) in Trench 1 yielded the highest cereal grain count of all the examined samples, comprising over 700 free-threshing wheat grain specimens (Coutu 2007, 30). This sample also contained the widest diversity of wild seeds although they represented a minimal proportion (3.50%) of the remains. The relatively high concentration of cereal grains in this context led Coutu to suggest that the associated building may have been used for drying or storing grain and to recommend future study of the surrounding contexts (Coutu 2007, 42). This context now however does not appear to have served as a post-hole for any buildings in Trench 1 and may be better interpreted as a refuse pit (Young 2016, personal communication). The sample with the highest proportion of wild seeds (20.80%) was also collected from Oswald's Gate, from a 13th-century rubbish deposit (Coutu 2007, 30, 37-38). A sample collected from a 14th-century cooking pit in the West Ward, Trench 8, yielded the second-highest cereal-grain count, including 58 free-threshing wheat grains. Only 1.50% of the identified seeds in this sample were wild species (Coutu 2007, 30). Coutu concluded that despite the artefactual and documentary evidence suggesting the West Ward's use as a production site during the 12th to 14th centuries, including evidence of metalworking, stoneworking and a mill, the archaeobotanical remains from both Oswald's Gate and the West Ward were representative of consumption rather than production activities (Coutu 2007, 41, 43). Her conclusion was based on the low proportions of wild species and chaff across the assemblage. According to Coutu these

observations confirmed that Bamburgh Castle received pre-cleaned grain, as is expected of a high-status medieval site (2007, 43). Although few in number, the diversity of identified weed seeds were representative of a range of growing environments, indicating that crop-fields from different areas contributed to Bamburgh's food supply, perhaps as tax payments from farmers throughout the surrounding countryside (Coutu 2007, 48). Throughout the site overall, free-threshing wheat (likely bread wheat, see Coutu 2007, 35) is the most abundant cereal grain identified in Coutu's study, followed by oats and then barley, although the two latter species are represented in similar quantities (no more than 36 oat and 16 barley specimens per sample) (Coutu 2007, 30).

The approach adopted by Coutu for distinguishing between production and consumption sites is methodologically problematic, as demonstrated by van der Veen and Jones (2006). In short, the comparison of proportions of weed, chaff and grains is more likely to provide information about the scale of agricultural activity at the site, rather than distinguish between production and consumption (van der Veen and Jones 2006). Coutu does not consider the individual crop-processing stages represented by each of her samples and does not take into account the potential uses for weeds and chaff beyond cereal-processing waste. Coutu also does not define the activities of which production or consumption consist for the purpose of her study. The activities across the West Ward and Oswald's Gate are therefore likely to have been more nuanced than can be expressed through the dichotomy of production and consumption sought by Coutu's study.

3. ARCHAEOBOTANICAL BACKGROUND: ENGLAND, 9th-12th CENTURIES

3.1 Cuisine and Identity in Anglo-Saxon and Anglo-Norman England

The Anglo-Saxon diet has been described as unsophisticated (Banham 2003, 119-20; Magennis 1999). Banham observes that during the 10th century, Anglo-Saxon monks using monastic sign-language had a smaller range of breads to communicate than their continental counter-parts (Banham 2003, 119-120). This sign-language, as taught by the Anglo-Saxons, also seems to indicate that wine was considered in association with the Christian mass rather than with table-fare (Banham 2003, 119-120). It is also interesting to note that the Anglo-Saxons did not differentiate linguistically between vegetables and spices (Banham 2003, 126). Banham suggests that increased sophistication of English cuisine occurred after the Norman Conquest (Banham 2003, 119-120). Of particular interest to this study is the question of whether Anglo-Saxon cuisine was affected by the introduction of a Norman elite into England and to what extent the nature of these cuisines can inform us about cultural identities in the region during this period of political transition. After all, food is an intrinsic part of cultural identity (Guptill *et al.* 2013). A cuisine, comprising culinary choices and practices, including ingredient selection and preparation methods, must remain consistent for a time in order to become representative of the culture in which it is developed (Guptill *et al.* 2013; Hastorf 2016, 67-73). Changing cuisines therefore are important markers of transformations in cultural identity, whether indicated by the adoption of select new spices or shifts in cooking practices (Hastorf 2016, 67-73). Although some changes in English cuisine over the transition from Anglo-Saxon to Anglo-Norman periods have been noted archaeologically, there is much work to be done before a thorough

understanding of whether, and to what extent, culinary changes were taking place across England and throughout social classes (Jervis *et al.* 2016). Through zooarchaeological analysis Sykes (2007) discovered that changes in animal consumption were occurring particularly at high-status sites over this period, most notably: an unprecedented preference for pig (and perhaps a shift in the pig breeds being raised) and an increase in hunting and hawking. Analysis of lipid residues on ceramics has supported the increase in pig consumption noted zooarchaeologically (Jervis *et al.* 2017). Younger pigs were also preferred in the Anglo-Norman diet (Jervis *et al.* 2017). In general, Sykes interprets her findings to demonstrate an increased level of luxury characterising Anglo-Norman elite diets, compared not only to the diets of the Anglo-Saxon elite but also those of the pre-Conquest Norman elite (see van der Veen 2003 for discussion of dietary luxury). The wealth acquired through the Norman Conquest was displayed by enjoying foods (such as wild game and exotic birds) and preparations of foods that were inaccessible to those of lesser means (Sykes 2007, 90). Access to wild game was highly restricted under Norman forest law (Sykes 2006). To follow Thorstein Veblen's terminology, the conspicuousness of elite consumption increased after the Norman Conquest (Banta 2007). Sykes draws attention to changes in the etiquette surrounding food preparation and consumption as well, changes which tended toward displays of excess while simultaneously serving to assert a pious identity for the Norman upper-class (Sykes 2007, 90-93). Documentary sources emphasize changes in table etiquette, particularly among the elite (Jervis *et al.* 2017). It is clear from Sykes' 2007 study however that we should not expect to find stark contrasts in the archaeological record: for example, the species domesticated and consumed by Anglo-Saxons for the most part did not change

(particularly not for the general population) with the arrival of the Normans but more subtle changes in food preparation methods are perceptible (Sykes 2007). Jervis, in a study of ceramics from Southampton, identified differences in cooking methods and changes to locally-produced cooking vessels after Norman settlement in the town. Jervis noted the introduction of slower cooking, especially boiling of meat, in post-Conquest Southampton – a practice that was particularly concentrated in the French households (Jervis *et al.* 2017). A restructuring of the town's layout, driven by differences in social identities, was also observed during this study (Jervis 2013). Through these studies, a picture is emerging of not merely the Anglo-Saxon adoption of Norman tastes and practices but also the development of new practices which resulted from the context of the Conquest itself: the merging factors of Anglo-Saxon and Norman interactions, of Norman settlement in a new landscape and of Anglo-Saxon efforts to emulate the new elite of England (Sykes 2007; Jervis 2013; Jervis *et al.* 2017). Perhaps the formation of new identities, attributable neither entirely to Anglo-Saxon nor to Norman culture, are being identified. Excitingly, new research is being conducted to explore *The Dietary Impact of the Norman Conquest* in Oxford, focusing on changes in health, diet and cooking practices between pre- and post-conquest England through studies of artefacts, human osteology, stable isotope analysis on human bone collagen and lipid residue analysis (Cardiff University 2016). A project led by Robert Webley at the University of York is also currently investigating continuity and change in portable metalwork over the period (British Museum 2016). Archaeobotany however remains an understudied area of Norman Conquest archaeology, in spite of its potential to contribute to our

understanding of cultural identities in England (Van der Veen *et al.* 2013, 172; Moffett 2012, 349-351).

Jervis (2013) asserts that the material objects used day-to-day contributed to the processes of cultural change over this period, rather than merely reflecting social changes that took place, just as social status is expressed and created through consumption rather than consumed foods being merely a reflection of social status (Guptill *et al.* 2013). It may be useful to think of the archaeobotanical record through the lens of this theoretical approach: rather than considering plant-use as a reflection of cultural changes or continuities, we might consider that engagement with plant ingredients could help create cultural change and, when continued, the formation of new socio-cultural identities.

3.2 Plant-Based Economy in Anglo-Saxon England

The central role of food to the economy, social structure, identity and health of the Anglo Saxons has been explored through many lenses, from linguistics and literature to ceramic studies to bioarchaeology, and further exploration continues to be called for, especially of the understudied archaeobotanical evidence (see Banham and Faith 2014; Magennis 1999, Woolgar *et al.* 2006; Biggam 2003; Moffett 2012; Van der Veen *et al.* 2013). Documentary evidence has demonstrated that plant foods, especially cereals, contributed more to the Anglo Saxon diet than any other food source, for poor and wealthy individuals alike (Stone 2006; Banham 2003, 119). Cereals are also the best-preserved plant-food remains in carbonized contexts (from which the majority of archaeobotanical evidence has been collected) and thus their roles in Anglo-Saxon

society are perhaps best understood, though that understanding is evolving all the time (Moffett 2012, 347; Banham 2003, 119; Mckerracher 2015). Cereal crops during the Anglo-Saxon period were more diverse than crops commercially grown today, with the benefit of being more resilient to changes in climate and soil character, and the inconvenience of being uneven in the timing of seed maturity for harvest (Banham and Faith 2014, 21; Moffett 2006, 47). In spite of the inherent hardiness of these plants however, crops were far from entirely resistant to environmental stressors. A 1095 entry in the Anglo-Saxon chronicle, for example, recounts a year of “very unseasonable weather” wherein “all the earth-crops ripened all too moderately throughout all this land” (Swanton 1996, 232). Differences in climate and geography across regions within Britain also affected diversity within species, though it is difficult to say whether or not regional varieties would have been distinguishable to the Anglo-Saxon observer, especially considering how few Old English words for wheat were used in comparison to the range of wheat species that have been identified archaeobotanically on Anglo-Saxon sites (Banham and Faith 2014, 21, 23).

For decades barley (*Hordeum vulgare*) has been viewed as the dominant Anglo-Saxon cereal crop until the 8th century, when bread wheat (*Triticum aestivum*) became the more dominant crop (Banham 2003, 119; Hagen 1995, 21). This understanding is based primarily on literary clues and a comparison of the *ubiquity* of cereal species identified at archaeological sites over time (that is, recording the presence or absence of species in relevant contexts) rather than more quantitative assessments of the *relative abundance* of grains per species (Banham and Faith 2014 24, 28, 63; Mckerracher 2015, 89-90). Banham suggests that increasing temperatures in the Late-Saxon period enabled

farmers in the lowlands to grow bread wheat more successfully, while in the highlands, where temperatures may not have been so accommodating, people may have continued to rely on barley for bread (Banham 2003, 121). Literary evidence suggests that Northumbria may have been one particularly challenging region for growing bread wheat (Banham and Faith 2014, 32-33). It has recently been argued however, that the archaeological evidence no longer supports the theory of bread-wheat's replacement of barley in importance during the mid-Saxon period (Mckerracher 2015). In light of more recently available evidence, Mckerracher concludes that barley and free-threshing wheat held a "joint-primacy" in the Anglo-Saxon diet over the 5th to 9th centuries (Mckerracher 2015, 96). Mckerracher's conclusions are drawn from examining both the ubiquity and relative abundances of cereal species at over 80 archaeological sites, however it is worth noting that his study featured sites in Southern England only, located in Breckland, Ely and the Thames Valley – all rural sites, with the exception of Ipswich (Mckerracher 2015).

There were certainly advantages to the continued cultivation of hulled cereal crops. Hulled cereals, such as hulled barley, are better protected from animal pests and fungal growth and are therefore better suited to long-term storage under a variety of conditions (Moffett 2012, 349; Banham and Faith 2014, 29). Either way, scholars can agree that bread wheat and barley were the top contributors to diet throughout the Anglo-Saxon period (Banham and Faith 2014, 22; Mckerracher 2015). Although bread wheat has been noted archaeologically in contexts as early as the Neolithic, several scholars consider such early finds of the cereal to be intrusive, based on the radiocarbon dating of cereal grain specimens (Moffett 2012, 349; Pelling *et al.* 2015). The wide-

spread predominance of bread wheat as a cereal crop was a development of the Anglo-Saxon period (Moffett 2012, 349; Pelling *et al.* 2015). Other cereal species cultivated by the Anglo-Saxons included rye (*Secale cereale*), oat (*Avena sp.*), emmer (*Triticum diccocon*), spelt (*Triticum spelta*) and possibly rivet wheat (*Triticum turgidum*) (Banham and Faith 2014, 23; Moffett 2012, 350-351; Moffett 2007, 178). There is no archaeological evidence for the cultivation of millet during this period, in spite of its inclusion in an Anglo-Saxon agricultural fertility charm (Hagen 1995, 26).

The respective properties of different cereals often influenced the ways in which they were used. Free-threshing or bread wheat became preferred for bread-making, especially among those who could afford to make frequent use of this more expensive cereal (Banham and Faith 2014, 24-25). Barley was also used for breads, particularly for the less wealthy, while it was, and still is, especially suited for brewing (Hagen 2006, 33-35). Rye, a particularly hardy cereal with long straw employed for thatch, was also used for bread (Moffett 2012, 351; Hagen 2006, 37-38). It is thought that oat was mostly grown for fodder, though it could certainly have been consumed in pottage, porridge and bread, especially when other crop harvests were scarce (Hagen 2006, 35-37).

Archaeological evidence demonstrates an increase in the cultivation of rye and oats during the mid-Saxon period, a pattern that continues into the later Middle Ages (Mckerracher 2015; Hall and Huntley 2007, 242; Green 1994, 84-85). Spelt and emmer, although grown throughout the Anglo-Saxon period, do not appear to have been major crops (Mckerracher 2015, 89; Mckerracher forthcoming). In spite of their potential for the production of ale, archaeological evidence has yet to associate emmer or spelt with the production of alcohol (Moffett 2012, 348-349).

Of course, cereals were not the only plant foods enjoyed by the Anglo-Saxons. Pulses were also important economic crops. On Anglo-Saxon sites, such as Hamwic (Southampton), cultivated legumes are found to be better represented in mineralized deposits than in the carbonized deposits where cereal grains dominate (Moffett 2012, 352). Celtic bean may have been the only pulse crop cultivated on a field scale while peas (*Pisum sativum*), requiring more intensive care, were grown in gardens (Banham and Faith 2014, 34-36; Banham 2003, 124). Common vetch (*Vicia sativa*), typically grown as a fodder crop, may have been eaten in times of need, although special treatment would have been required to neutralize the pulse's toxicity for human consumption (Moffett 2012, 352; Banham and Faith 2014, 37). Vegetables and herbs would have been grown on a small scale (Banham and Faith 2014). Herbs with potential for culinary use such as dill (*Anethum graveolens*), black mustard (*Brassica nigra*) and fennel (*Foeniculum vulgare*) are present in some Anglo-Saxon archaeobotanical assemblages (Vince 1991; Mckerracher forthcoming; Kenward 1995; Carruthers 2005); their presence seems concentrated at sites identified as high-status, such as Lyminge, but also at port sites such as York and London (Livarda and van der Veen 2008; Mckerracher forthcoming; Kenward 1995; Vince 1991).

Fruits and nuts were variably gathered from wild plants, cultivated in gardens and orchards or imported, though archaeological evidence for their consumption is limited, appearing mainly in waterlogged and mineralized contexts (Moffett 2012, Banham 2003, 127-128). The growing of apples and pears is described in contemporary documentary sources and apple/pear (*Malus/Pyrus*) seeds have been found archaeologically, for example at Hamwic (Southampton) and Anglo-Scandinavian York

(Hagen 2006, 58; Carruthers 2005; Pelling 2011). Documentary sources such as Anglo-Saxon leechdoms suggest that multiple varieties of apple were enjoyed (Hagen 2006, 57). By the late 12th century, trees were being grafted to produce preferred qualities in fruits such as apples and plums (Hagen 2006). Seeds and pits from raspberries/blackberries (*Rubus spp.*), strawberries (*Fragaria vesca*), elderberry (*Sambucus nigra*) sloes (*Prunus spinosa*), plums (*Prunus domestica*), grapes (*Vitis vinifera*), figs (*Ficus carica*), mulberries (*Morus nigra*) and walnut shell fragments (*Juglans sp.*) have all been recovered archaeologically from Anglo-Saxon deposits (e.g. Murphy and Fryer 2014; Pelling 2011; Kenward 1995; Vince 1991; Roach 1985; Carruthers 2005; Mckerracher forthcoming). In spite of the Anglo-Saxon diet's perceived lack of sophistication, exotic plant ingredients were not unknown to Anglo-Saxon England, though they were likely consumed in small quantities and restricted to elite circles (Mckerracher forthcoming; Livarda 2011). Some fruits enjoyed in early medieval England, such as grapes, figs, mulberries and walnuts, were not native to the British Isles and there is both documentary and archaeological evidence for extensive trade networks that would have made such commodities available to Anglo-Saxons (see Nightingale 1995, 6-22; McCormick 2001; Loveluck 2013). Bamburgh, having been identified as a potential early medieval harbour, may have been well-placed to receive foreign goods directly (Ferguson 2012).

Because the English climate could have sustained the growth of some foreign species to an extent, interpretations of their macrobotanical remains as imported or locally grown are rarely definitively made. This uncertainty is of especial relevance to grape cultivation. There is textual evidence for the keeping of vineyards in England

during the Anglo-Saxon period (Hagen 2006). Although it would have been possible to grow grapes in parts of England, particularly in the south, there is little archaeological evidence to demonstrate conclusively that they were cultivated locally rather than imported, though such evidence is not entirely absent: pollen evidence for Anglo-Saxon vineyards has been identified at Market Lavington, Wiltshire (Carruthers 2005, 162). There is however plenty of archaeological evidence for the importation of wine into England during the period, such as ceramic remains at York and Southampton (Steane 1985, 276). Grape seeds are usually interpreted as imported, likely in the form of raisins, particularly where there is no archaeological evidence for wine-production (e.g. Carruthers 2005; Kenward 1995). An increase in the planting of vineyards in England is among the cultural changes long ascribed to Norman settlement, though it is important to note that this increase in local vineyards also coincided with increased average temperatures (Platt 1978, 2; Steane 1985, 276). By 1086 Domesday Book noted fifty-five vineyards across England, though wine continued to be imported from continental Europe (Steane 1985, 276). Some native or long-naturalized English fruit species were imported as well, in spite of their ability to be grown in England. For example, hops (*Humulus lupulus*) uncovered in the excavation of the 10th-century Graveney Boat were interpreted as imported in the context of the boat's other foreign contents, such as French ceramics, though hops grows naturally in Britain (Wilson 1975). Hop remains have also been identified at Coppergate York (Kenward 1995). Hops have been used as a foodstuff, for brewing, dyeing and for medicine (Wilson 1975).

Plants made up the majority of ingredients in Anglo-Saxon medical recipes (Cockayne 1864; Cameron 1993). Occasionally, archaeological evidence of medicinal

plant use has been identified such as in a 10th-century pit at Milk Street London, containing a concentration of henbane (*Hyoscyamus niger*), opium poppy (*Papaver somniferum*) and cannabis (*Cannabis sativa*) seeds (Vince 1991: 349). According to the surviving leechbooks, most ingredients in Anglo-Saxon remedies were native to England but many were of foreign origin such as dill, coriander, fennel, cumin, cinnamon, ginger and black pepper (Cockayne 1864; Livarda and van der Veen 2008). Dill, coriander and fennel, for example, though not native, could have been grown successfully in England and have since been naturalized in the British Isles (Livarda and van der Veen 2008). Other important medicinal ingredients were certainly imported, such as black pepper from India which, according to documentary sources, had found its way to England by the early 8th century (McCormick 2001, 620; Beckett 2003, 64). Black pepper, along with other exotic spices reportedly known to early medieval England, has yet to be identified archaeobotanically in Anglo-Saxon contexts (Livarda 2011; Jervis *et al.* 2017). Such spices, as medicines and culinary additives, were highly valued and served as lucrative trade items for merchants from England and abroad (Nightingale 1995; McCormick 2001).

Plant products also had extra-dietary roles in Anglo-Saxon England. Although the main purpose of cereal cultivation was certainly the provision of food, cereal grains and their by-products were also used as bedding, building materials, fodder, ceramic temper and fuel (Hagen 2006; Moffett 2006; 45). Other plants such as flax and hemp were used for textile production (Moffett 2012, 355-356; Banham and Faith 2014, 38). Some were used to dye textiles, such as woad (*Isatis tinctora*) and madder (*Rubia tinctorum*) – both of which have been found archaeologically (e.g. Kenward 1995). In addition to their

major contributions to human and animal subsistence, crop plants were central to the Anglo-Saxon economy, the development of agricultural technologies and, for many, the organization of daily life (see Banham and Faith 2014; Hagen 2006). Documentary evidence illustrates the economic importance of cereals, demonstrating that wheat and other grains, rather than coin, could be used to pay for services and dues (Hagen 2006, 29-31).

3.3 Gaps in the Archaeobotanical Data

There is an unfortunate dearth in archaeobotanical data from the Anglo-Saxon period (Moffett 2012; Hall and Huntley 2007, 124). Geographically, northern England suffers from a lack of archaeobotanical study and this is true for all archaeological periods, not merely the early Middle Ages (Van der Veen *et al.* 2013). Archaeobotanical study of Bamburgh castle has the potential to contribute toward filling these gaps. To date, the archaeobotany of Bamburgh Castle has only barely been explored: only ten contexts have so far been assessed, in spite of the Bamburgh Research Project's total sampling strategy at the site (Huntley 2007 Coutu 2007; Graeme 2016, personal communication). Such extensive sampling for archaeobotanical remains as has been conducted at Bamburgh is rare in British archaeological projects (Van der Veen *et al.* 2013). Although the preservation of organic remains in many contexts at Bamburgh is not splendid, the site's temporally deep occupation, complete sampling strategy and situation in a region lacking in archaeobotanical observations offer great potential to contribute to the archaeobotanical dataset for the region over several time-periods (Young 2016, personal comm.; Van der Veen *et al.* 2013). It has now been ten years since the last archaeobotanical analysis of the Castle's West Ward (Coutu 2007; Huntley

2007), and samples have been accumulating every field season since. Armed with a more detailed understanding of the site's stratigraphy since the 2007 analyses, archaeobotanical study may now contribute to answering more chronologically-specific research questions. Moffett (2012, 358) has identified a need for the inclusion of archaeobotany in the exploration of cultural changes and continuities throughout England over the Anglo-Saxon period and Bamburgh Castle provides opportunity for an examination of such changes from the perspective of a high-status site.

3.4 Applications of Archaeobotanical Data to Broader Research Questions

Although a decade has passed since the *Shared Visions: North East Regional Research Framework for the Historic Environment* was released, the authors' call for a "more textured and nuanced understanding of the archaeology of the early medieval North-East (England)" remains a relevant one (Petts and Gerrard 2006, 155). Loveluck (2002) has stressed the importance of studying the social networks linking identified northern British sites with each other rather than merely studying each site in its own right. It has been demonstrated historically and archaeologically that patterns of collection, movement and consumption of agricultural goods were central to these social networks, often involving the payment and receipt of tax renders (Loveluck 2013, 144-145, 2002). More extensive and detailed research into the nature of these agricultural goods has the potential to provide greater insight into such networks with sites both near and far. Archaeobotanical investigation can help expand and add detail to the consumption and production narratives that are emerging through interpretation of the site's other archaeological remains. The understanding of cultural identities in northeastern England has also been identified as an area requiring further research (Petts

and Gerard 2006, 217). Bamburgh Castle's early medieval plant remains have yet to be compared to other relevant sites across the British Isles. Such a comparison could provide useful information toward understanding influences on dietary preferences and the cultural identities reflected in cuisine at Bamburgh. Large, high-quality archaeobotanical datasets are especially scarce for early medieval Britain and the situation in the North of England is particularly dire (Van der Veen *et al.* 2013). At the comparable site of Dunbar, very low macrobotanical preservation was observed and a quantitative description of the few cereal remains was not published (Perry 2000, 280-283). Quantitative data are available for crop cereal remains from the site at Dunadd, though counts are very low for all species (Lane and Campbell 2000, 221-225). Archaeobotanical analysis of material from Edinburgh Castle found few remains from the early medieval period but quantitative data was recorded (Driscoll and Yeoman 1997, 190-199). The site's chronological depth invites studies of changes in plant use over time, among other avenues of research. Bamburgh's recognized cultural, political and social importance warrants as thorough an examination as possible of all categories of remains at the site.

4. METHODOLOGY

4.1 Environmental Sampling and Flotation

The Bamburgh Research Project has continually collected environmental remains from Bamburgh Castle from 1996 through to the present, though environmental sampling methods at the site have changed over the course of the project (Coutu 2006; Young 2016, pers. comm.). Flotation of sediments began on site in 2006, at which time

20 litres of sediment from each context were floated (Coutu 2006). At present a total sampling strategy is employed for the recovery of environmental remains, where all excavated materials from each context are collected for flotation (Coutu 2006; Young 2016, personal communication). The sediment volume of each sample is therefore dependent on the size of the excavated context. Flotation is currently conducted on site using a siraf-style flotation tank with a 0.5mm-aperture mesh (Fox 2016). Prior to 2016, a 1.0mm mesh was used in the tank (Fox 2016). After flotation, the flot and heavy fractions are dried and stored separately in labelled plastic bags.

4.2 Sample Selection

Flot samples collected from Trenches 1, 3 and 8 in Bamburgh Castle's West Ward were analyzed for this study. Samples dating from the 8th through 14th centuries were received by the author from site director Graeme Young and brought to the University of Nottingham's archaeobotany laboratory for analysis. A preliminary assessment of the samples was undertaken in order to prioritise samples yielding higher quantities and diversity of macrobotanical remains. Samples were also selected so that the Anglo-Saxon and Anglo-Norman periods were represented by approximately equal numbers of samples. Very large samples, namely from grain-drying kiln contexts 1035, 1487, 1488 and 1489, were divided by riffle box in order to minimize bias in sub-sampling.

4.3 Identification and Quantification of Macrobotanicals

Over 200 hours of lab-work were spent on the sorting, identification and quantification of charred plant remains for this project. Carbonized macrobotanical remains were identified using a stereoscopic microscope, up to 40x magnification.

Identifications were made with the help of the University of Nottingham archaeobotanical reference collection, consisting of modern charred and uncharred seeds, reference literature and identification manuals (e.g. Cappers *et al.* 2006; Bojnanský and Fargašová 2007). All plant items were counted according to the minimum number of individuals present. Modern plant material, where observed, was not quantified but is noted in the results section where found in abundance. The presence of faunal remains is also reported in the results section. Archaeological cereal grain specimens were counted according to the occurrence of embryo ends. Where pulses were found in halves, all fragments were collected and the minimum number of individual pulses was assessed according to the number of halves present for each taxon or, where more specific taxonomic classifications were not possible, size category. Pulse fragments smaller than a full cotyledon were quantified according to identifiable features present on the fragments. All identifiable wild seed specimens were counted and seeds that were small-sized but too fragmentary or distorted to identify to family were quantified under the “wild indeterminate” category. Due to the high fragmentation of seeds in some contexts, and the tendency for “wild indeterminate” specimens to be fragmentary, the quantities in this category may be over-representative of the numbers of wild seeds preserved. Samples were examined in their entirety except where samples contained in excess of 600 seeds. Samples 184, 246 and 248, collected from contexts associated with the grain-drying kiln, each contained thousands of seed specimens and were therefore subsampled (see above). Identification for these samples was halted once 500 to 600 specimens were counted, having reached a statistically significant representation of the sampled contexts (Van der Veen and Fieller 1982).

4.4 Terminology

The nomenclature used for identified specimens follows Stace (2010). Throughout this report, specimens that were identified as *Avena sp.* are referred to as oats, without specification between wild and cultivated oat as such distinction cannot be made without well-preserved floret-bases, of which very few were recovered. Many of the seeds quantified as “indeterminate Poaceae” are ‘oat-like’, though small, in morphology but the preservation quality was not high enough to justify identification as c.f. *Avena sp.* Thus, some indeterminate Poaceae grains may also have been cultivated *Avena sp.* This problem of identification has been dealt with similarly in other archaeobotanical investigations of Saxon sites (e.g. Moffett 1989, 9). Many seeds in this category were likely wild *Avena* or *Bromus* species (Cappers *et al.* 2006), but the absence of physical *Bromus* seed specimens in the University of Nottingham reference material did not allow for these identifications to be made. It is however fairly common for archaeobotanical reports on this period to include an *Avena sp./Bromus sp.* category, where distinctions were not made between the two taxa (e.g. Stevens 2011). In retrospect, it would have been ideal to separate the indeterminate Poaceae into different categories, such as Large Poaceae/*Avena sp.*, c.f. *Avena sp./Bromus sp.*, and Small Poaceae, and these distinctions may be worth quantifying in the future. Small, non *Avena/Bromus*-like Poaceae seeds make up the minority of seeds quantified as indeterminate Poaceae. The term free-threshing wheat is used throughout this report to refer to bread/club-wheat, *Triticum aestivo-compactum*, as *Triticum aestivum* and *Triticum compactum* can only be differentiated by their rachis segments and these were not preserved in the samples analysed.

5. RESULTS

5.1 Trench 1 (Table 1; Figure 3)

| TRENCH 1: Charred Plant Remains | | | | | | | | | | |
|---|-----------------------|------|------|------|------|------|-------|-------|-------|-------|
| Sample # | | 184 | 248 | 247 | 246 | 200 | 199 | 162 | 101 | 193 |
| Context | | 1035 | 1489 | 1488 | 1487 | 1319 | 1322 | 1159 | 1278 | 1276 |
| Trench | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Date (century) | | 9-10 | 9-10 | 9-11 | 9-11 | EM | EM-12 | 12-14 | 11-13 | 12-14 |
| Volume (L, approximate) | | 9 | 2 | 7 | 82 | n/a | n/a | n/a | 60 | 70 |
| Cereals | | | | | | | | | | |
| <i>Avena</i> sp. | Oat | 287 | 377 | 247 | 235 | 6 | 25 | 2 | 27 | 34 |
| <i>Avena</i> sp. grain with floret base | | 2 | | | 1 | | | | 2 | |
| <i>Avena</i> cult. floret base (no grain) | | 3 | 3 | | 4 | | | | | 1 |
| <i>Avena</i> sp., c.f. | | 128 | 20 | 1 | 56 | 3 | 8 | 2 | 4 | 7 |
| <i>Hordeum vulgare</i> (naked or hulled indet.) | Barley | | | 2 | 3 | 23 | 4 | 4 | 36 | 16 |
| <i>Hordeum vulgare</i> , hulled | | | | | 1 | 9 | 2 | 3 | 22 | 17 |
| c.f. <i>Hordeum vulgare</i> | | | | 1 | | 8 | 9 | 5 | 16 | 10 |
| <i>Hordeum</i> Twisted | | | 1 | | | | | | | |
| c.f. <i>Hordeum</i> rachis segment | | | | | | 1 | | | | |
| <i>Secale cereale</i> | Rye | | | | | 1 | | | | |
| c.f. <i>Secale cereale</i> | | 1 | | | | | | | | |
| <i>Triticum aestivo-compactum</i> | Free-threshing wheat | 3 | 10 | 2 | 5 | 6 | 10 | 56 | 63 | 254 |
| c.f. <i>Triticum aestivo-compactum</i> | | 1 | 3 | 1 | | | 26 | 36 | 7 | 45 |
| Indet. cereal spp. | | 6 | 2 | 1 | 7 | 33 | 64 | 45 | 30 | 28 |
| Economic Pulses | | | | | | | | | | |
| Fabaceae | Indet. economic pulse | | | | 2 | | | | | 2 |
| <i>Vicia faba</i> | Celtic bean | | | | 2 | | | | | |
| c.f. <i>Vicia sativa</i> | Common vetch | | | | 2 | | | | | |
| Wild | | | | | | | | | | |
| <i>Artemisia</i> sp. | Mugwort | | | 1 | 1 | | | | | |
| Asteraceae sp(p). | Aster | | | | 3 | 1 | 2 | | | 5 |
| <i>Atriplex</i> sp(p). | Orache/saltbush | 1 | 4 | 5 | 5 | 1 | 1 | 1 | 3 | |
| Brassicaceae sp(p). | Crucifers | | | 1 | | 3 | | 1 | | |
| <i>Brassica nigra</i> | black mustard | | | | 1 | | | | | 1 |
| c.f. <i>Brassica nigra</i> | | | | | | | | | | 1 |
| <i>Carex</i> sp. | Sedge | | | | | 14 | 5 | 1 | | 5 |
| <i>Carex</i> c.f. <i>acuta</i> | | | | | | 3 | | | | |
| <i>Carex elata</i> | | | | | | 3 | 1 | | | |
| <i>Carex elongata</i> | | | | | | 2 | | | | |
| Caryophyllaceae sp(p). | Carnations | | | | 1 | | 1 | 2 | 6 | 8 |
| Caryophyllaceae sp(p)/Chenopodioideae sp(p). | Carnations/Amaranths | | | | | | | | 2 | |
| Chenopodioideae sp(p). | Amaranths | | 1 | | | 2 | 7 | | | |
| <i>Chenopodium</i> sp(p). | Goosefoot | | | | 3 | 1 | | | | 3 |
| <i>Chenopodium album</i> | Fat hen | | 3 | | 4 | 2 | 1 | | 10 | 5 |
| Cyperaceae sp(p). | Sedges | | | | 1 | 5 | 4 | 2 | 2 | 5 |
| Fabaceae sp(p). | Wild pulses | | | | 3 | | | | | |
| Fabaceae sp(p). (econ. or wild) | Pulses indet. | | | 5 | | | | | | |
| c.f. Geraniaceae spp. | Geranium family | | | | 2 | | | | | |
| <i>Galium</i> c.f. <i>sylvaticum</i> | Bedstraw | | | | | | 7 | | | |
| <i>Glebionis segetum</i> | Corn marigold | 1 | 11 | 4 | 48 | 3 | 40 | 4 | 5 | 7 |
| <i>Hyoscamus niger</i> | Black henbane | | | | 2 | 1 | 1 | | | |
| <i>Isoleptis setacea</i> | Bristle club-rush | | | | | 1 | | | | |
| <i>Juncus</i> sp. | Rush | | | | | 2 | | 1 | 2 | 3 |
| <i>Lathyrus/Vicia</i> sp. | Vetches | | | | | 1 | | | | |

Table 1: Quantification of charred macrobotanical specimens identified in Trench 1, West Ward, Bamburgh Castle

| TRENCH 1: Charred Plant Remains (continued) | | | | | | | | | | |
|--|----------------------|--------------|---------------|--------------|-------------|-------------|--------------|--------------|--------------|--------------|
| Sample # | | 184 | 248 | 247 | 246 | 200 | 199 | 162 | 101 | 193 |
| Context | | 1035 | 1489 | 1488 | 1487 | 1319 | 1322 | 1159 | 1278 | 1276 |
| Trench | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Date (century) | | 9-10 | 9-10 | 9-11 | 9-11 | EM | EM-12 | 12-14 | 11-13 | 12-14 |
| Volume (L, approximate) | | 9 | 2 | 7 | 82 | n/a | n/a | n/a | 60 | 70 |
| <i>Lens</i> sp. | Lentil | | | | 1 | | | | | |
| <i>Linum</i> sp. | Wild flax | | | | 3 | | | | | |
| <i>Montia fontana</i> | Water chickweed | | | | | 3 | | | | |
| c.f. <i>Montia fontana</i> | | | | | | 1 | | | | |
| c.f. <i>Phleum</i> sp. | Timothy | | | | | | | | | 1 |
| c.f. <i>Pisum</i> sp. | Pea | | | | 1 | | | | | |
| Poaceae spp. | Grasses | 96 | 90 | 239 | 127 | 46 | 36 | 10 | 26 | 40 |
| Polygonaceae sp(p). | Knotweed/Buckwheats | | | | | 3 | | | | |
| Polygonum sp(p). | Knotweed | | | | | 7 | | 2 | | 1 |
| Potentilla sp. | Cinquefoil | | | | | 24 | | | | 1 |
| <i>Ranunculus flammula</i> | Spearwort | | | | | 23 | | | 4 | |
| <i>Raphanus raphanistrum</i> (fruit) | Wild radish | 2 | 4 | 2 | | 1 | | | 1 | |
| <i>Rubus</i> sp. | Raspberry/blackberry | | | | | | 1 | | | |
| <i>Rumex</i> sp(p). | Dock | | 1 | 1 | 1 | 220 | 7 | 4 | 4 | |
| c.f. <i>Rumex</i> sp. | | | | | | | | | | 2 |
| <i>Scirpus</i> sp./ <i>Eleocharis</i> sp. | Sedge | | | | 1 | 13 | | | | |
| <i>Scirpus annuus</i> All. | Bulrush | | | | | 13 | 2 | | | |
| <i>Silene</i> sp. | Campion/catchfly | | | | | 3 | | | | |
| <i>Spergula arvensis</i> | Corn spurry | | | | 1 | | 1 | | | |
| <i>Stellaria media</i> | Chickweed | | 1 | | 2 | | | | | |
| <i>Stellaria</i> c.f. <i>pallida</i> | Lesser chickweed | | | | | | 3 | | | |
| Trifolieae sp(p). | Clovers/medicks | | | | 1 | | | | | |
| Trifolieae sp(p)., c.f. | | | | | | 1 | | | | |
| <i>Vicia</i> sp. | Vetch | | | | | | | | | 5 |
| c.f. <i>Vicia</i> sp. | | | 3 | | 1 | | | | | 6 |
| <i>Vicia</i> c.f. <i>lathyroides</i> | Spring vetch | | | | | | | | | 1 |
| Wild indet. | Wild indet. | 1 | | 7 | 10 | 33 | 59 | 18 | 6 | 11 |
| Other Indet. | | | | | | | | | | |
| Bud indet. | | | | | | 43 | | 2 | | 2 |
| c.f. rootlet fragments | | | | | | 20 | | | | |
| c.f. tuber fragments | | | | | | 10 | | | | |
| stem indet. | | | | | | pres. | | | | pres. (1) |
| Charred organic matter | | | | | | | | pres. (30) | | |
| Total items | | 532 | 534 | 520 | 541 | 599 | 327 | 201 | 278 | 527 |
| Sediment Volume (L) | | 9 | 2 | 7 | 82 | n/a | n/a | n/a | 60 | 70 |
| Preserved items per litre | | 59.11 | 267.00 | 74.29 | 6.60 | n/a | n/a | n/a | 4.63 | 7.53 |

Table 1 (continued)

Sample 101, Context 1278, Trench 1

The density of macrobotanical remains in this sample is 4.6 items per litre.

Macrobotanical remains were well-preserved in this sample, including a few large charcoal fragments (up to twenty millimetres in maximum length). Barley and free-threshing wheat were preserved in approximately equal amounts in this context and oat

is present in a lesser quantity. The wild taxa present include *Atriplex sp.*, *Chenopodium album*, *Cyperaceae spp.*, *Glebionis segetum*, *Juncus sp(p).*, wild Poaceae, *Raphanus raphanistrum*, *Ranunculus flammula*, and *Rumex sp(p)*. About fifteen small mammal bones and approximately sixty-five small gastropod shells were noted in this sample. Mycorrhizal fungus was also present.

Sample 162, Context 1159, Trench 1 (bag 1 of 2, no sample number)

The density of macrobotanical remains in this sample is unknown, as the sediment volume data was unavailable at the time of writing this report. Most of the cereals in this sample are free-threshing wheat but a few grains of barley and oat were also identified. Wild species are fairly sparse in this sample: *Atriplex sp.*, Brassicaceae sp., *Carex sp.*, Caryophyllaceae spp., *Glebionis segetum*, *Juncus sp.*, wild Poaceae spp., *Polygonum spp.*, *Rumex sp(p)*. Several clumps (approximately thirty) of what appears to be charred organic matter were observed in this sample, measuring between five and twenty-five millimetres in maximum length. Small, possibly bird, bone, ten small gastropod shells and a few insect fragments, both charred and uncharred, were also present.

Sample 193, Context 1276, Trench 1

The density of macrobotanical remains in this sample is 7.5 items per litre. The cereal remains are dominated by free-threshing wheat, followed by barley and then oat. This context features the greatest representation of free-threshing wheat among the contexts examined here. Two unidentified economic pulse specimens were also identified. Asteraceae spp., *Brassica nigra*, *Carex spp.*, Caryophyllaceae sp(p)., *Chenopodium album*, *Glebionis segetum*, *Juncus sp.*, wild Poaceae spp., c.f. *Phleum sp.*,

Polygonum sp., *Potentilla sp.*, c.f. *Rumex sp.*, wild *Vicia sp.*, and *Vicia c.f. lathyroides* make up the sample's wild taxa. Small mammal bone and uncharred insect fragments were noted, as well as mycorrhizal and hypoxylon fungus.

Sample 184, Context 1035, Trench 1

A 1/16 subsample of this sample was studied. The density of macrobotanical remains in this sample is very high – third highest of the samples assessed here – at an estimated 945.8 items per litre (Table 3). Hundreds of *Avena sp.* grains dominate this sample. Four specimens of free-threshing wheat and one possible rye grain are also present. The absence of barley here is notable. A small number of *Avena sp.* floret bases were also preserved in this sample. Wild flora are represented by *Atriplex sp.*, *Glebionis segetum*, and *Raphanus raphanistrum* (fruit). Wild Poaceae were recovered in relatively high numbers however, as explained in the Methods section of this report, the majority of wild Poaceae recovered from the site were oat-like in morphology though preservation and/or size did not allow these specimens to be identified as *Avena sp.* One uncharred insect fragment was noted.

Sample 199, Context 1322, Trench 1

The density of macrobotanical remains in this sample is unknown. Many charcoal fragments (up to 15 millimetres in maximum length) are found in this sample. Free-threshing wheat is the most common cereal in this sample, followed by oat then barley. The preservation of cereals is poor, featuring distorted, puffed seeds with eroded surfaces. A large mass of modern root or grass made processing difficult as some seeds were likely not extracted from the mass. The wild assemblage is made up of Asteraceae

sp., *Atriplex* sp., *Carex* sp., *Chenopodium album*, *Galium* c.f. *sylvaticum*, a high count of *Glebionis segetum*, *Hyoscamus niger*, wild Poaceae spp., *Rubus* sp. (the only commonly-eaten fruit seed identified across the site so far), *Rumex* spp., *Scirpus annuus*, *Spergula arvensis*, and *Stellaria* c.f. *pallida*. Small mammal bone and tooth as well as about fifteen small gastropod shells were observed.

Sample 200, Context 1319, Trench 1

The density of macrobotanical remains in this sample is unknown. Although cereals were present in this sample – mainly barley, including one barley rachis segment, but also some oat and free-threshing wheat – their preservation was poor and the majority of remains were wild species: Asteraceae sp., *Atriplex* sp., Brassicaceae spp., *Carex* spp., *Chenopodium album*, *Glebionis segetum*, *Hyoscamus niger*, *Isoleptis setacea*, *Juncus* sp., wild *Lathyrus/Vicia* sp., *Montia fontana*, wild Poaceae spp., *Polygonum* sp(p)., *Potentilla* sp., *Raphanus raphanistrum*, *Ranunculus flammula*, *Rumex* spp., *Scirpus annuus*, *Scirpus* sp./*Eleocharis* sp., *Silene* sp. and *Trifolieae* sp. Of all taxa identified in the sample, *Rumex* spp. was by far the most abundant. This sample also contained many small, unidentified, carbonized flower buds which were occasionally present in other samples but in very low numbers. Small masses of plant tissue that are thought to be rootlet and wild tuber fragments were also found in unprecedented quantities. Small carbonized stem fragments were also noted in larger numbers than in other samples but were not identified. The stems were compared with modern *Rumex* spp. stems in case they corresponded with the high quantity of *Rumex* seeds. The archaeological specimens did not however match the morphology of modern *Rumex* stems. Small mammal and

Actinopterygii bone and approximately thirty-five gastropod shells were noted in this sample.

Sample 246, Context 1487, Trench 1

A 1/16 subsample from this sample was studied. The density of macrobotanical remains in this sample is 105.6 items per litre. The macrobotanical remains are well-preserved. The majority of cereal grains in this sample are oats, followed by equally scarce free-threshing wheat and barley. Economic pulses are represented in very low numbers by c.f. *Pisum*, *Vicia faba* and c.f. *Vicia sativa* as well as unidentified economic pulse fragments. *Artemesia sp.*, Asteraceae spp., *Atriplex sp(p).*, *Brassica nigra*, *Chenopodium album*, Cyperaceae sp., c.f. Geraniaceae sp., a notably high count of *Glebionis segetum*, *Hyoscamus niger*, *Lens sp.*, *Linum sp.* (not identified in any other samples analyzed to date), wild Poaceae spp., *Rumex sp.*, *Scirpus sp./Eleocharis sp.*, *Spergula arvensis*, *Stellaria media*, Trifolieae sp(p)., and unidentified wild pulses made up the wild component of the sample. Two small gastropod shells and a few uncharred insect fragments were also found.

Sample 248, Context 1489, Trench 1

A 1/8 subsample of this sample was studied. The density of macrobotanical remains in this sample is the highest of all samples assessed here at 2136 items per litre (Table 3). The sample is dominated by hundreds of *Avena sp.* grains but also includes a few free-threshing wheat grains and one twisted *Hordeum vulgare* was identified. This is the only barley grain so far recovered from the site that is thought to have a twisted morphology independent from the effects of taphonomy. *Atriplex spp.*, *Chenopodium*

album, *Glebionis segetum*, *Raphanus raphanistrum*, *Rumex sp.*, *Stellaria media* and wild c.f. *Vicia sp.* make up the wild component of the sample. Wild Poaceae are also present in considerable numbers and are of the same character as those described from Sample 184.

Sample 247, Context 1488, Trench 1

A 1/16 subsample of this sample was studied. The density of macrobotanical remains in this sample is the second-highest of the samples assessed here at 1188.6 items per litre (Table 3). Cereal remains in this sample are composed nearly entirely of oat. Barley and free-threshing wheat are scarcely present. A few fragments of unidentified pulses were also identified in this sample, which may or may not have been used economically. Wild species are represented by *Artemesia sp.*, *Atriplex sp.*, Brassicaceae sp., *Glebionis segetum*, wild Poaceae spp. (the majority of which are likely wild *Avena* or *Bromus* species), *Raphanus raphanistrum*, and *Rumex sp.*

5.2 Trench 3 (Table 2; Figure 3)

Sample 357, Context 3209, Trench 3

This sample contained few specimens. The density of macrobotanical remains in this sample is 4.7 items per litre. Cereals are represented by oat, barley and free-threshing wheat. Oat and barley occur most frequently of these, but in quantities too low to lend significance to their dominance. A few wild specimens, including a possible *Aphanes sp.* seed, *Raphanus raphanistrum* fruit and wild Poaceae and Brassicaceae species were also present in low numbers. One seaweed thallus fragment was also recovered from this sample.

Sample 365, Context 3249, Trench 3

Sample 365 contained cereals dominated by barley, then oat, and a range of wild species: *Atriplex* sp., *Carex* spp. *Chenopodium* spp., wild Poaceae spp., *Persicaria* sp., *Polygonum* spp., *Rumex* spp., *Spergula* sp., *Scirpus* sp., and *Stellaria* spp, all in low numbers. The density of macrobotanical remains in this sample is 4.3 items per litre. Seaweed thallus fragments were also present. Modern Cyperaceae seeds were noted in this sample.

Sample 366, Context 3213, Trench 3

There are many charcoal fragments (up to 15 millimetres in maximum length) in this sample. The density of macrobotanical remains in this sample is 6.6 items per litre. The preservation of seeds here is poor, with much dirt caked on the seeds. Barley, oat and free-threshing wheat are all present in very low quantities in this sample. *Atriplex* sp., *Carex* sp., *Chenopodium album*, *Juncus* sp., wild Poaceae, *Raphanus raphanistrum* (fruit), *Rumex* spp., and *Scirpus* sp./*Eleocharis* sp. were also identified. About ten small gastropod shells were noted, as well as mycorrhizal and hypoxylon fungi and modern Caryophyllaceae and Cyperaceae Poaceae and *Rumex* seeds.

Sample 369, Context 3248, Trench 3

Many large fragments of charcoal (up to twenty-five millimetres in maximum length) were observed in this flotation sample. The density of macrobotanical remains in this sample is 7.0 items per litre. The sample yielded cereals dominated by barley and also including oat, though in low numbers. One indeterminate pulse fragment was observed but whether this was from an economic or wild species was not established.

Atriplex sp., *Brassica nigra*, *Brassica oleracea*, *Carex* spp., *Caryophyllaceae* spp., *Chenopodium* spp., wild *Poaceae* spp., *Polygonum* spp., *Rumex* spp., c.f. *Sinapis* sp., and *Trifolieae* sp. This sample contained the greatest quantity of seaweed thallus fragments of the samples assessed. Uncharred insect remains were also present. Some decomposing modern tissue paper remained in the sample bag for this context.

Sample 378, Context 3331, Trench 3

Charcoal fragments in this sample are small and few. The density of macrobotanical remains in this sample is the lowest of the samples examined here, at 3.2 items per litre. The cereal remains are equally dominated by oat and barley but also include two grains of free-threshing wheat. However, the number of cereals that could not be identified to genus, due to poor preservation, is approximately equal to that of each dominant cereal. Therefore the relative representation of cereal remains may be skewed by poor preservation. One possible cereal rachis segment was also recovered but could not be identified further. *Asteraceae* sp., *Atriplex* sp(p), *Carex* spp., *Chenopodium album*, wild *Poaceae* spp., *Polygonum* spp., *Rumex* spp., *Scirpus* spp., *Spergula* sp., and *Trifolieae* sp(p) were also identified. This sample yielded the second-greatest quantity of seaweed thallus fragments of those examined for this report. Three gastropod shells are present in this sample, as well as over thirty insect fragments, a couple of which appeared charred, and bird bone.

Sample 393, Context 3242, Trench 3

The density of macrobotanical remains in this sample is quite high, at 48.9 items per litre. Preservation of macrobotanical remains in this context is poor and the wild seeds

especially are highly fragmented. Surface textures are frequently corroded and overall shapes are often distorted. This sample includes cereal grains – oat in the greatest quantity, followed by barley and free-threshing wheat – but wild seeds make up the majority of the assemblage: c.f. *Aphanes* sp., *Arenaria* sp., Asteraceae spp., *Atriplex* sp., *Brassica nigra*, *Carex* spp., Caryophyllaceae spp., *Chenopodium album*, *Juncus* sp(p)., *Persicaria* sp., wild Poaceae spp., *Polygonum* spp., *Potentilla* sp., *Ranunculus flammula*, Rosaceae sp., *Rumex* spp., *Scirpus* sp./*Eleocharis* sp., *Scirpus annuus*, and Trifolieae sp(p). In comparison to other samples, a large proportion of wild specimens could not be identified to family and are categorized as “wild indet.” These specimens are however highly fragmented and therefore likely overestimate the quantity of individual seeds actually represented. A few insect fragments, some charred, were also present as well as mycorrhizal fungus.

Context 3113, Samples 1/2 and 2/2 (no sample number), Trench 3

These environmental samples featured poor preservation and the density of macrobotanical remains in this sample is unknown. The sample contained many charcoal fragments (up to twenty-five millimetres in maximum length) and a few cereal grains, slightly dominated by free-threshing wheat but also including barley and oat – all in low numbers. One seaweed thallus fragment was observed from this context. Wild taxa are represented by Caryophyllaceae spp., Cyperaceae spp., *Galium* sp., *Glebionis segetum*, c.f. *Montia fontana*, wild Poaceae, *Polygonum* sp., *Ranunculus flammula*, *Rumex* sp(p)., *Scirpus* sp./*Eleocharis* sp., and *Stellaria media*. Actinopterygii and small mammal bone was noted, as well as one charred mammal bone fragment and one charred insect fragment. Modern mycorrhizal fungus was also observed.

Sample 354/355, Context 3201, Trench 3

A few, very small fragments of charcoal were observed in this sample. The density of macrobotanical remains is unknown. Very few counts of barley, free-threshing wheat and oat are present in this sample. A few pulse fragments of undetermined economic value were also present. Wild specimens of *Atriplex sp.*, Caryophyllaceae sp., *Chenopodium album*, Cyperaceae sp., *Montia fontana*, *Persicaria sp.*, wild Poaceae spp., *Rumex sp.*, and *Scirpus annuus*, were also few. This sample also contained seaweed thallus fragments. Small mammal bone and fragments of hypoxylon fungus were present as well. Degrading modern tissue was found in the sample bag.

Sample 411, Context 3419, Trench 3

The density of macrobotanical remains in this sample is 4.9 items per litre. This sample contained a few specimens of barley, fewer still of oat and only one grain of free-threshing wheat. Wild specimens identified in this sample were *Atriplex sp.*, *Brassica nigra*, wild Poaceae spp., *Polygonum sp.* and *Raphanus raphanistrum* (fruit). One seaweed thallus fragment was recovered from this sample.

| TRENCHES 3 and 8: Charred Plant Remains | | | | | | | | | | | |
|---|----------------------|------|------|------|------|------|------|------|--------|---------|-------|
| Sample # | | 369 | 365 | 366 | 378 | 393 | 411 | 357 | 1 of 2 | 354/355 | 803 |
| Context | | 3248 | 3249 | 3213 | 3331 | 3242 | 3419 | 3209 | 3113 | 3201 | 825 |
| Trench | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 8 |
| Date (century) | | 8-9 | 8-9 | 9 | 9 | 9-10 | 9-10 | 12 | 12 | EM-12 | EM-12 |
| Volume (L, approximate) | | 15 | 30 | 26 | 50 | 10 | 10 | 10 | n/a | n/a | 12 |
| Cereals | | | | | | | | | | | |
| <i>Avena</i> sp. | Oat | 7 | 12 | 6 | 20 | 59 | 5 | 7 | 5 | 6 | 5 |
| <i>Avena</i> sp., c.f. | | 1 | | 3 | 5 | 15 | 1 | | 1 | | 4 |
| <i>Hordeum vulgare</i> (naked or hulled indet.) | Barley | 13 | 23 | 4 | 19 | 5 | 10 | 7 | 4 | 5 | 6 |
| <i>Hordeum vulgare</i> , hulled | | 5 | 6 | 2 | 3 | 1 | 3 | 1 | 3 | 5 | 1 |
| <i>Hordeum vulgare</i> , c.f. | | 1 | 2 | 3 | 1 | 4 | 6 | | 1 | 3 | 2 |
| <i>Triticum aestivo-compactum</i> | Free-threshing wheat | | | 6 | 2 | 10 | | 1 | 17 | 5 | 51 |
| c.f. <i>Triticum aestivo-compactum</i> | | | | | | 3 | 1 | 2 | 8 | 1 | 5 |
| <i>Triticum aestivo-compactum/spelta</i> | | | | | | | | 1 | | | |
| Indet. cereal spp. | Indet. Cereal | 7 | 6 | 28 | 22 | 22 | 3 | 9 | 4 | 9 | 5 |
| c.f. rachis segment | | | | | 1 | | | | | | |
| Economic Pulses | | | | | | | | | | | |
| Fabaceae spp. | Pulse indet. | | | 6 | | | | | | | |
| Wild | | | | | | | | | | | |
| c.f. <i>Aphanes</i> sp. | Parsley-piert | | | | | 2 | | 1 | | | |
| <i>Arenaria</i> sp. | Sandwort | | | | | 1 | | | | | |
| Asteraceae | Aster | | | | 1 | 8 | | | | | |
| <i>Atriplex</i> sp(p). | Orache/saltbush | 5 | 1 | 3 | 2 | 2 | | | | 2 | 2 |
| c.f. Boraginaceae | Borage | | | | | 1 | | | | | |
| Brassicaceae sp(p). | Crucifers | 2 | | | | | | 1 | | | |
| c.f. Brassicaceae | | | | | | 1 | | | | | |
| <i>Brassica nigra</i> | Black mustard | 1 | | | | 1 | 1 | | | | |
| <i>Brassica</i> c.f. <i>oleracea</i> | Wild cabbage | 1 | | | | | | | | | |
| <i>Carex</i> sp. | Sedge | 1 | 4 | 5 | 7 | 22 | | | | | |
| c.f. <i>Carex</i> sp. | | | | 4 | | | | | | | |
| <i>Carex elata</i> | | 1 | | | 2 | | | | | | |
| <i>Carex elongata</i> | | 1 | | | | | | | | | |
| Caryophyllaceae sp(p). | Carnations | 2 | 3 | | 4 | 8 | | | 5 | 1 | 1 |
| Caryophyllaceae sp(p)/Chenopodioidae sp(p). | Carnations/Amaranths | 3 | | | | 3 | | | | | |
| Chenopodioidae sp(p). | Amaranths | | 7 | | 2 | 3 | | | | | 1 |
| c.f. Chenopodioidae sp(p). | | | | | 1 | | | | | | |
| <i>Chenopodium</i> sp(p). | Goosfoot | 2 | 6 | 6 | | 4 | | | | | |
| <i>Chenopodium album</i> | Fat hen | 3 | 3 | 3 | 2 | 12 | | | | 1 | |
| Cyperaceae sp(p). | Sedges | | 3 | | 1 | 1 | | | 1 | | 1 |
| Cyperaceae c.f. | | | | | | | | | | 1 | |
| Fabaceae indet. (econ. or wild) | Pulses indet. | 1 | | | | | | | | 3 | |
| <i>Galium</i> sp. | Bedstraw | | | | | | | | 1 | | |
| <i>Glebionis (Chrysanthemum) segetum</i> | Corn marigold | | | | | | | | 1 | | 1 |
| <i>Juncus</i> sp. | Rush | | | 1 | | 13 | | | 1 | | |
| <i>Montia fontana</i> | Water chickweed | | | | | | | | | 1 | |
| c.f. <i>Montia fontana</i> | | | | | | | | | 1 | | |
| <i>Persicaria</i> sp. | Knotweed | | 1 | | | 2 | | | | 1 | |
| c.f. <i>Phleum</i> sp. | Timothy | 1 | | | | | | | | | |
| Poaceae spp. | Grasses | 5 | 8 | 36 | 16 | 130 | 9 | 3 | 22 | 3 | 10 |
| Polygonaceae sp(p). | Knotweeds/Buckwheats | | 2 | | 1 | | | | | | |
| Polygonaceae (fruit with perianth) | | | | | 2 | | | | | | |
| <i>Polygonum</i> sp(p). | Knotweed | 7 | 3 | | 9 | 5 | 1 | | 1 | | 1 |
| <i>Potentilla</i> sp. | Cinquefoil | | | | | 1 | | | | | |
| c.f. <i>Potentilla</i> sp. | | | | | | 3 | | | | | |
| <i>Ranunculus flammula</i> | Spearwort | | | | | 1 | | | 1 | | |
| <i>Raphanus raphanistrum</i> (fruit) | Wild radish | | | 1 | | | 1 | 1 | | | |
| Rosaceae | Rose family | | | | | 1 | | | | | |
| <i>Rumex</i> sp(p). | Dock | 2 | 7 | 10 | 6 | 37 | | | 4 | 1 | 2 |
| <i>Scirpus</i> sp./ <i>Eleocharis</i> sp. | Sedge | | | 1 | 3 | 5 | | | 1 | | 1 |
| <i>Scirpus annuus</i> All. | Bulrush | | 3 | | 2 | 1 | | | | 1 | |

Table 2: Quantification of charred macrobotanical specimens identified in Trenches 3 and 8, West Ward, Bamburgh Castle

| TRENCHES 3 and 8: Charred Plant Remains (continued) | | | | | | | | | | | |
|---|------------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|------------|------------|-------------|
| Sample # | | 369 | 365 | 366 | 378 | 393 | 411 | 357 | 1 of 2 | 354/355 | 803 |
| Context | | 3248 | 3249 | 3213 | 3331 | 3242 | 3419 | 3209 | 3113 | 3201 | 825 |
| Trench | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 8 |
| Date (century) | | 8-9 | 8-9 | 9 | 9 | 9-10 | 9-10 | 12 | 12 | EM-12 | EM-12 |
| Volume (L, approximate) | | 15 | 30 | 26 | 50 | 10 | 10 | 10 | n/a | n/a | 12 |
| <i>c.f. Sinapis sp.</i> | Mustard | 1 | | | | | | | | | |
| <i>Spergula arvensis</i> | Corn spurry | | 1 | | 1 | | | | | | |
| <i>Stellaria media</i> | Chickweed | | 1 | | | | | | 4 | | 1 |
| <i>Stellaria c.f. pallida</i> | Lesser chickweed | | 1 | | | | | | | | |
| Trifolieae sp(p). | Clovers/Medicks | 2 | | | 2 | 5 | | | | | |
| <i>Viola sp.</i> | Viola | | | | | 1 | | | | | |
| Wild indet. | Wild indet. | 3 | 10 | 44 | 3 | 93 | 5 | 10 | 10 | 5 | 4 |
| Other Indet. | | | | | | | | | | | |
| Bud indet. | | 1 | | | | 3 | | 2 | 1 | | 1 |
| <i>c.f. Parenchyma</i> | | 1 | 1 | | | | | | | | |
| Seaweed fragments, bumpy | | 9 | 8 | | 1 | | 1 | | 1 | | |
| Seaweed fragments, smooth | | 16 | 4 | | 20 | | | 1 | | 3 | |
| Seaweed fragents, ribbed | | | | | | | | | | 1 | |
| stem fragments | | | | | | pres (2) | | | pres (1) | | |
| <i>c.f. Rootlet fragments</i> | | | | | | | | | | | |
| <i>c.f. Tuber fragments</i> | | 1 | | | | | | | 1 | | |
| Indet. tuber/parenchyma | | | 2 | | | | | | | | |
| Total Seeds | | 106 | 128 | 172 | 161 | 489 | 49 | 47 | 99 | 58 | 105 |
| Sediment Volume (L) | | 15 | 30 | 26 | 50 | 10 | 10 | 10 | n/a | n/a | 12 |
| Preserved items per litre | | 7.07 | 4.27 | 6.62 | 3.22 | 48.90 | 4.90 | 4.70 | n/a | n/a | 8.75 |

Table 2 (continued)

5.3 Trench 8 (Table 2)

Sample 803, Context 825, Trench 8

The density of macrobotanical remains in this sample is 8.8 items per litre.

Charcoal fragments are few and very small. This sample contains mainly free-threshing wheat but also some barley and oat, as well as a range of wild taxa in low quantities:

Atriplex sp., Caryophyllaceae sp., Chenopodioideae sp., Cyperaceae sp., *Glebionis segetum*, wild Poaceae spp., *Polygonum sp.*, *Rumex sp(p)*. *Scirpus sp./Eleocharis sp.*, and *Stellaria media*. This was the only sample from Trench 8 deemed rich enough to include in this analysis during the preliminary assessment. One small mammal bone, about five small gastropod shells and a few modern insect fragments were observed. Mycorrhizal fungus and an abundance of modern *Stellaria media* were also present.

5.4 Cultivated Species at Bamburgh

The main cultivated plant species recovered from Bamburgh Castle are oat (*Avena* sp.), barley (*Hordeum vulgare*) and free-threshing wheat (*Triticum aestivo-compactum*). The lack of *Triticum* rachis segments made identification between bread-wheat (*Triticum aestivum*) and club-wheat (*Triticum compactum*) impossible but it is assumed that the free-threshing wheat at Bamburgh was used for bread-making.

Although the majority of barley grains across the site were not identified as naked or hulled due to poor preservation, many were found to be hulled while none of the grains were clearly naked. It is assumed that most, if not all, of the more poorly preserved barley specimens were hulled as well, which would be typical of the period (e.g. Holden 2006, 151; Murphy 2009). Only one barley grain (sample 248, context 1489) appeared to feature a twisted morphology associated with six-rowed barley, however the lack of rachis segments does not allow for identification of the majority of grains to be made beyond *Hordeum vulgare*.

The oats recovered from the site could for the most part not be identified to species due to the lack of florets – the only aspect of the grain from which bristle or black oat (*Avena strigosa*), wild oat (*Avena fatua*, *Avena sterilis*) and common oat (*Avena sativa*) can be reliably distinguished from one another (Banham and Faith 2013, 30-31; Ross 2016, 240). The few intact *Avena* sp. floret bases present were identified as cultivated *Avena sativa*. In addition to *Avena sativa*, *Avena strigosa* was intentionally cultivated in Northumbria during the Anglo-Saxon period (Holden 2006, 151). *Avena strigosa* is typically characterised by smaller grains than those of *Avena sativa* but can only

properly be distinguished by the long, twisted awns found on its florets (Holden 2006, 151). It is worth noting however that the size-range of *Avena sp.* grains recovered from Bamburgh did vary considerably. Many of the indeterminate Poaceae grains featured heavily eroded surfaces but the general morphology of the majority of these specimens was similar to *Avena sp.* These indeterminate Poaceae are found in greatest quantities in the samples containing the greatest concentrations of oats (contexts 1035, 1487, 1489, 1488 and 3242). While many of these Poaceae are likely wild *Avena sp.* or *Bromus sp.*, cultivated *Avena sp.* grains are also likely represented in this category. *Avena fatua* and *Avena sterilis* continue to be problematic weeds in modern English crop fields (Banham and Faith 2014, 30). It is possible that wild oat contaminants were not targeted for removal from the crop during the Anglo-Saxon period, on account of the difficulty of their removal, their resemblance to the cultivated species and perhaps their suitability toward the intended use of the harvest, and thus their identification as wild or weedy inclusions may not be entirely accurate (see Jones and Halstead 1995 on the tolerance of contaminating species).

The remains of pulses at Bamburgh, including lentils, Celtic bean, peas and vetches are, in keeping with the archaeobotany of the period in general to date, quite scarce (Banham and Faith 2014, 35). The preservation of pulse specimens was also very poor, making genus identifications difficult in several cases. Overall, the low quantities of pulses represented do not allow for significant analysis to be undertaken.

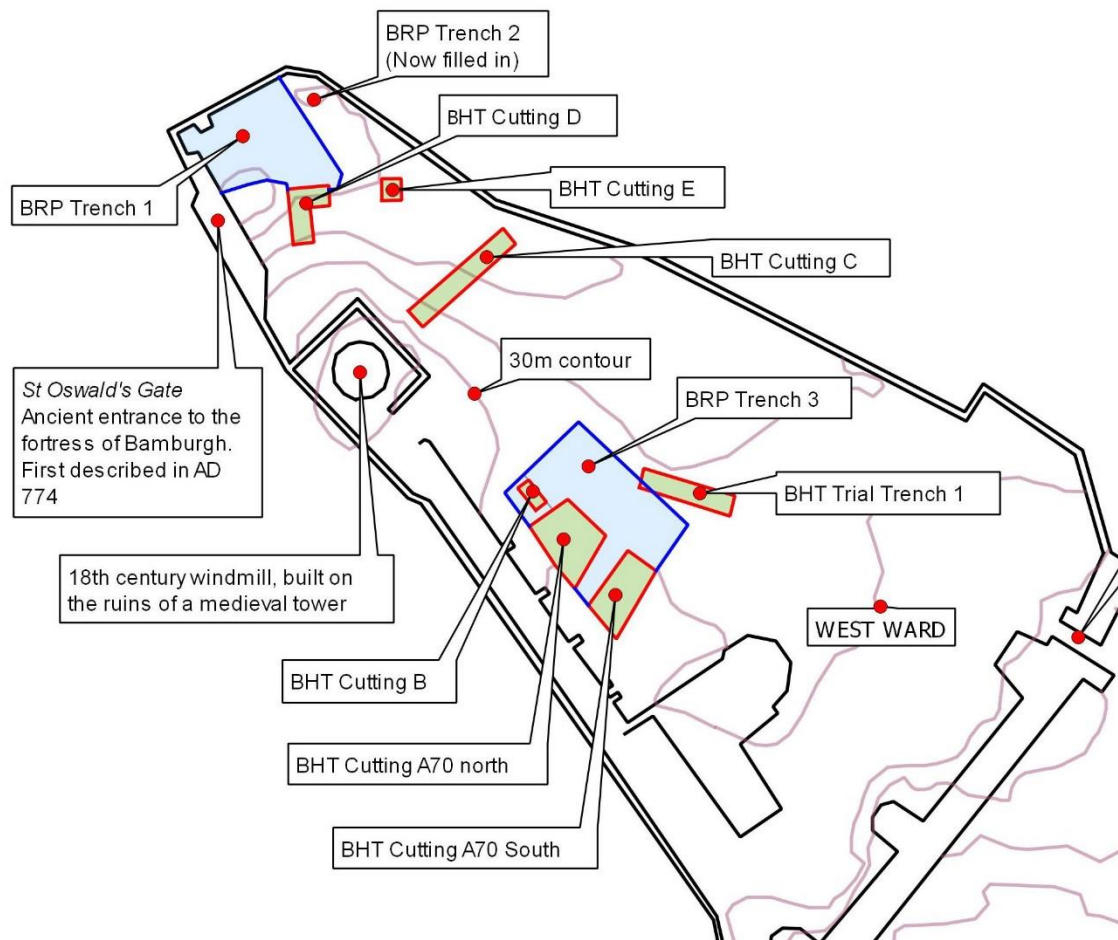


Figure 3: West Ward Trenches 1 and 3, Bamburgh Castle

6. ANALYSIS

In the following section the macrobotanical remains from each sample are analyzed and, where possible, interpreted in reference to the spatial organization and phasing of their contexts, in association with any finds or features identified by the Bamburgh Research Project.

6.1 Integration with Previous West Ward Archaeobotanical Studies

Two of the five samples assessed by Huntley in 2007 fit within the temporal range of this study: samples 147 and 161, which had been dated to the Late Saxon to early

Norman and the Mid- to Late-Saxon periods at the time of her study (Huntley 2007). Unfortunately, a total of eight and three seeds were identified from these samples, respectively – too few to discuss further (Huntley 2007, 4). Two of the five samples from Coutu's 2007 study fit with the later limits of this study, dating to between the 12th and early 13th centuries, and have been incorporated into the analyses below: sample 137, context 1098 and sample 803, context 825.

6.2 Analysis Methodology

To begin analysis of the nineteen contexts from Bamburgh selected for this study, samples containing pure crops were identified; a pure crop being an assemblage of a particular crop taxon or group of taxa that could be grown together and would undergo the same sequence of crop-processing activities, such as free-threshing wheat and rye – both free-threshing cereals (see Wilkinson and Stevens 2003; Hillman 1981). Calculations were then applied to these pure crop samples to determine the crop-processing stages represented by each sample, after Hillman (1981). These calculations consist of assessing the ratios of cereal grains, cereal chaff and wild seeds within each sample (van der Veen 1992, 82). Determining whether or not each sample represented a 'pure' crop was not entirely straightforward in samples co-dominated by oat and barley. While the two taxa may well have been grown separately, there is also the possibility that they were grown as 'dredge' (spring barley and oat sown together) (Banham and Faith 2014, 36). Heterogeneously sown crops such as dredge, maslin (rye and wheat) and bullmong (oat, beans and peas) are described in later medieval documents and were likely planted in Anglo-Saxon agricultural practice as well, in order to take advantage of the different environmental tolerances of different crop taxa (Banham and Faith 2014,

36; Jones and Halstead 1995). Barley and oat are found in similar proportions throughout the 9th-10th-century contexts from Bamburgh Castle, excepting the samples taken from the grain-drying kiln in which oats are clearly dominant. These two taxa are also commonly found together in Anglo-Saxon samples elsewhere (Banham and Faith 2014, 36). In medieval England both barley and oat were mainly spring-sown cereals, though there were also winter-sown varieties of both taxa (Campbell 2007). Free-threshing wheat meanwhile, was a winter-sown crop (Campbell 2007). An ethnographic study of traditional agricultural methods in Greece found that monocrops were often eighty to ninety per cent composed of the intended species, with the remaining proportion consisting of contaminants (Jones and Halstead 1995). Mixed cereal crops however, varied widely in the proportions of each species sown, consisting of ratios between 50:50 and 80:20. (Jones and Halstead 1995, 104). Although Greek agricultural practices cannot be extrapolated to Anglo-Saxon farming, this study demonstrates that a heterogeneously sown crop such as dredge should not be assumed to contain equal proportions of each crop species. Thus, a sample containing 80 per cent barley and 20 per cent oat could be representative of either a barley monocrop with oat contaminants or a dredge crop.

Alternatively, samples roughly co-dominated by oat and barley may be representative of post-depositional mixing of separate crops, depending on the context, in which case the crop-processing stages of these independent crops could not be determined. Cereals could be mixed with other cereal types by being processed in the same areas, depending on how thoroughly the areas are swept or raked out between uses (Jones and Halstead 1995, 109-11). Such assemblages would be considered mixed rather

than pure. Evidence for the growing of oats separately from barley is found in the early medieval grain-drying kiln (see Discussion section). It is however possible for the different species in a mixed crop such as dredge to be separated after harvesting, if desired (Jones and Halstead 1995).

When calculating the wild species to crop ratio in her 2007 study, Coutu combined the counts for all cereal species noted in a sample and compared this value with the wild seed count, whether the sample represented a pure or mixed cereal assemblage (Coutu 2007, 30). Without first assessing the purity of the assemblage, one cannot determine the crop-processing stage represented by the remains. A mixed assemblage of cereals (similar proportions of multiple cereal species), unless likely representing a ‘maslin’ crop (in the general sense of the term) represents the deposition of multiple different crop harvests and their associated weeds. Therefore the processing stage of individual crop harvests cannot be isolated. Macrobotanical samples cannot be accurately compared to one another without first identifying their respective crop-processing stages (Van der Veen 1992, 81). Of the samples that coincide in date with this study, only sample 137 from context 1098 represents a pure crop – free-threshing wheat in this case.

6.3 Trench 3 (Central West Ward)

8th Century (possibly 9th century)

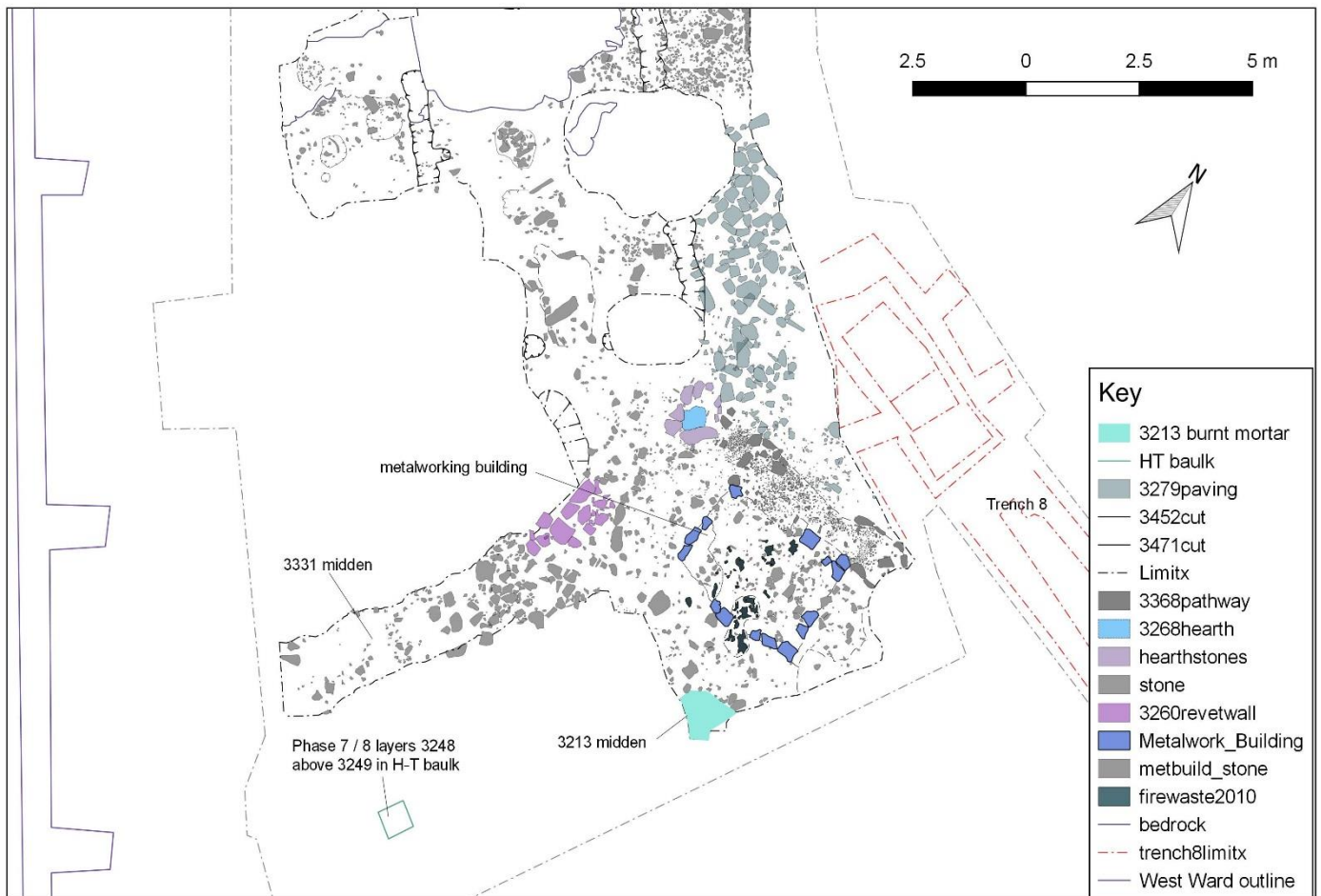
Context 3248 (sample 369) was a midden layer lying overtop of shell-layer context 3249 (sample 365) – the latter containing ferrous artefacts – in the rectangular baulk left by Hope-Taylor’s excavations (next to BRP Trench 3), likely dating to the 8th century (Young 2017, pers. comm.). Samples 369 and 365 are similar in macrobotanical

signature. Both samples are low in macrobotanical density and containing few item counts. A mixture of barley and oat were identified in these samples, with barley being in the greater proportion. There is no evidence of other cereal taxa or chaff remains in these contexts. One indeterminate pulse fragment was found in sample 369. The ratio of wild seeds to cereal grains is very high: 2.5:1 for wild seeds in sample 369 and 1.8:1 in sample 365. These assemblages are thus interpreted as either crop-processing residues which had been deposited here, whether intentionally or not. Though intentional deposition is possible given context 3248's identification as a midden layer. Samples 369 and 365 both contained several fragments of seaweed thallus.

9th Century

Contexts 3213 (sample 366) and 3331 (sample 378) were located on the eastern end of Trench 3. This side of the trench is characterized by a metal-working building, fire-waste, hammerscale and a cobble path in this period (Young 2017, pers. comm.). Both contexts have been identified as midden layers. Ferrous objects and a stone bead were recovered from 3213 (Young 2017, pers. comm.). Context 3331 contained a bone needle, bone comb, *styca* coins, and iron objects including a blade and a buckle (Young 2017, pers. comm.). Context 3331 is approximately 5m southwest of the metal-working building, while context 3213 is located just outside the south side of the structure (Figure 4). Both samples contained fairly low densities of macrobotanical remains, with context 3331 having the lowest macrobotanical density recorded in this study. Sample 378 features a co-dominance of oat and barley, with scarce representation of free-threshing wheat. The weed to grain ratio in sample 378 is quite high at 1.8:1; this sample also contained one indeterminate possible rachis segment. Sample 366 contained a

poorly-preserved mixture of barley, oat and free-threshing wheat, along with wild seeds. Both samples likely represent residual material from crop-processing. Sample 378 contained several seaweed thallus fragments.



Phase 8 location of sampled features, also included phase 7/8 H-T baulk

Figure 4: Trench 3 Context Plan, 9th Century. Copyright BRP.

9th-10th Centuries

Contexts 3242 (sample 393) and 3419 (sample 411) were excavated from the western end of Trench 3, on the south side. Context 3242 is located approximately 5m west from where the 9th-century metalworking building was identified on the east side of

the trench, and context 3419 is a couple meters further west of context 3242 (Figure 5). Context 3242 was a burnt deposit, containing *styca* coinage, lead objects and a horseshoe nail, associated with a large timber building which burned down in the late 9th to 10th century. The macrobotanical density of this context was quite high, containing a chaff-free pure oat crop, though barley and free-threshing wheat were also present in small quantities. The weed to cereal grain ratio was very high in this sample (393), between 3:1 and 5:1 (depending on whether or not indeterminate Poaceae are omitted from the weed count. As discussed above, many of the indeterminate Poaceae may have been used alongside the cultigen *Avena sp.*). This indicates that the crop had not been cleaned or that these are the remains of crop-processing residues. A wide variety of wild species is represented in this sample, though the highest counts are of indeterminate Poaceae and wild indeterminate seeds. Context 3419 may be associated with industrial metal-working activity (Young 2017, pers. comm.). The macrobotanical density of this context was low, co-dominated by oat and barley, though free-threshing wheat was also scarcely present. The wild seed to cereal ratio is 0.8:1 in this sample. Sample 411 also yielded on seaweed thallus fragment.

12th Century

This phase of Trench 3 is characterized by pebble-founded timber structures and thin midden layers (Young 2017, pers. comm.). Context 3209 (sample 357) was the fill, containing a quern stone fragment, of posthole 3211 and context 3113 (unknown sample number) was the fill, containing slag, of posthole 3112, located approximately 4m northwest of posthole 3211. Context 3209 had a low density of macrobotanical remains and the density of context 3113 is unknown. Context 3209 contained a mixed crop

assemblage of low counts of barley, oat and free-threshing wheat. A seaweed thallus fragment was also noted in this sample. Context 3113 contained a mixture of oat, barley and free-threshing wheat crops in low numbers and also included a seaweed thallus fragment.

Context 3201 is more vaguely dated to between the late early medieval period and the 12th century (Young 2017, pers. comm.). Context 3201 was an extensive midden layer dated to between the late 9th to 10th century and the 12th century. *Styca* coinage, and ferrous objects including a strap end were collected from this context (Young 2017, pers. comm.). This sample is of unknown macrobotanical density and contains a mixed crop assemblage in very low numbers of oat, barley and free-threshing wheat. This context also contained a seaweed thallus fragment.



Figure 5: Trench Context Plan, 9th and 10th Centuries. Copyright BRP.

Trench 3 Summary

There is no indication of large-scale crop-processing or storage in Trench 3 between the 8th and 12th centuries. One quern stone fragment was identified from a 12th-century posthole fill (3209) but was likely being reused for structural purposes rather than cereal-processing here. The only context to yield considerable quantities of cereals was 3242, in which oat was dominant. The context's association with a large timber building is interesting and the presence of lead objects and a horseshoe nail may indicate that the building was used for storing implements for the care of horses, if not horses themselves. The weed to oat ratio was very high in this context, but many studies have suggested that uncleaned or only partially cleaned oats would have been used as fodder during this period (e.g. Murphy 1987, Moffett 1994, Moffett 1989). This timber building may therefore also have stored some fodder, or been used as a place for feeding horses.

Although the wild species identified at Bamburgh are not the focus of this study, it is interesting to note that economic functions of some of these “weed” species may be overlooked, in particular with regard to the sedges (*Carex spp.* and other Cyperaceae). Seventy-seven coins unearthed from the southern region of Trench 3 appear to have been contained in cloth with carbonized sedge vegetation enveloping cloth containing the coins (Castling and Young 2011). Sedges may have been routinely used as packaging by creating woven mattings or baskets.

What have been tentatively identified as seaweed thallus fragments (with the assistance of Gill Campbell, Head of Environmental Studies at Historic England) (see Appedix, Figures a-e) were noted in samples across the 8th through 12th centuries in

Trench 3 only, particularly concentrated in the 8th - and 9th-century phases. Huntley (2007) identified *Fucus sp.* thallus fragments in an ambiguously dated Trench 1 robber-cut fill, but identifications could not be furthered in this study, due to a lack of reference material. Huntley suggests its presence as fuel or fertilizer (Huntley 2007, 6). According to Hagen (1995, 42), seaweed was part of the Anglo-Saxon diet, at least in some areas. Seaweed would be quite accessible to residents of Bamburgh Castle, given its location next to the sea. Middle Irish documents mention the use of different kinds of seaweed for cattle feed and for human consumption (Kelly 2000 43, 311-314). Kelly (2000, 312-313) notes the contributions of iron and iodine that seaweed would make to the diet. At Dunadd, although very few macrobotanical remains were recovered, the early medieval period at the site was characterized by “c.f seaweed” (Milles 2000, 223, 235). It is interesting that the seaweed identified in this study is associated especially with metal-working areas. Perhaps this is an indication of specialized seaweed usage in association to metal-working, in which case usage as fuel might be most likely. These fragments are also better represented in the 8th- and 9th- century phases.

6.4 Trench 8 (Baulk remaining from Brian Hope-Taylor excavations, West Ward)

Only one sample from Trench 8 was found to contain sufficient material for analysis. Context 825 (sample 803), a midden layer dated to between the late Early Medieval period and the 12th century, was located on the eastern end of Trench 8. This context contained glass and ferrous objects including a horse-riding spur and horseshoe fragment (Young 2017, pers. comm.). The macrobotanical density of this sample was low, but two further samples were also collected from this context which were not assessed by the author; in addition, the particular sample examined here may have been

contaminated (Fox 2017, pers. comm.). The cereal assemblage in this sample represents a pure free-threshing wheat crop with a weed to cereal ratio of 0.4:1, likely representing the discarded remains of a cleaned crop. Coutu (2007, 31) analysed one of the other samples from this context and found a mixed crop assemblage containing oat, barley and free-threshing wheat.

6.5 Trench 1 (Oswald's Gate, West Ward)

The phasing information for Trench 1 is less precise than that available for Trench 3.

9th to 11th Century

Contexts 1035 (sample 184), 1489 (sample 248) and 1488 (sample 247) were layers excavated from within a grain-drying kiln feature in the western corner of Trench 1 and 1487 (sample 246) was the kiln's demolition layer, excavated from the top of the feature (Figure 6). The kiln fill contexts contained the highest densities of macrobotanical remains of all contexts studied from Bamburgh so far (Coutu 2007; Huntley 2007). Macrobotanicals were especially dense in context 1489, at 2,136 charred items per litre. Demolition context 1487 had a far lower density of plant remains at only 105.6 items per litre. These density calculations are based on extrapolations of the identifications made from subsamples of each context. Subsamples measured between 1/16 and 1/8 of the total sample volumes. The relatively low density of plant material in context 1487 is likely due to the large amount of collapsed clay from the superstructure of the kiln that made up much of this context. 82 litres of material were collected and processed from this demolition layer, in contrast to the 2 to 9 litres that composed the much smaller kiln fill layers. The cereal remains in the kiln samples represent pure,

nearly chaff-free oat crops (*Avena sativa* was the only species identified from the scarce floret bases preserved) with very low weed to oat grain ratios in the kiln fill layers: 0.01:1 in 1035, 0.07:1 in 1489 and 0.09:1 in 1488. The demolition layer 1487 contains a higher but still low weed to oat ratio at 0.4:1. It is possible that these additional weeds entered context 1487 during the conflagration of the kiln. Interpretations of the kiln's structure, macrobotanical contents and role in the economy at Bamburgh are discussed below in the Discussion chapter.

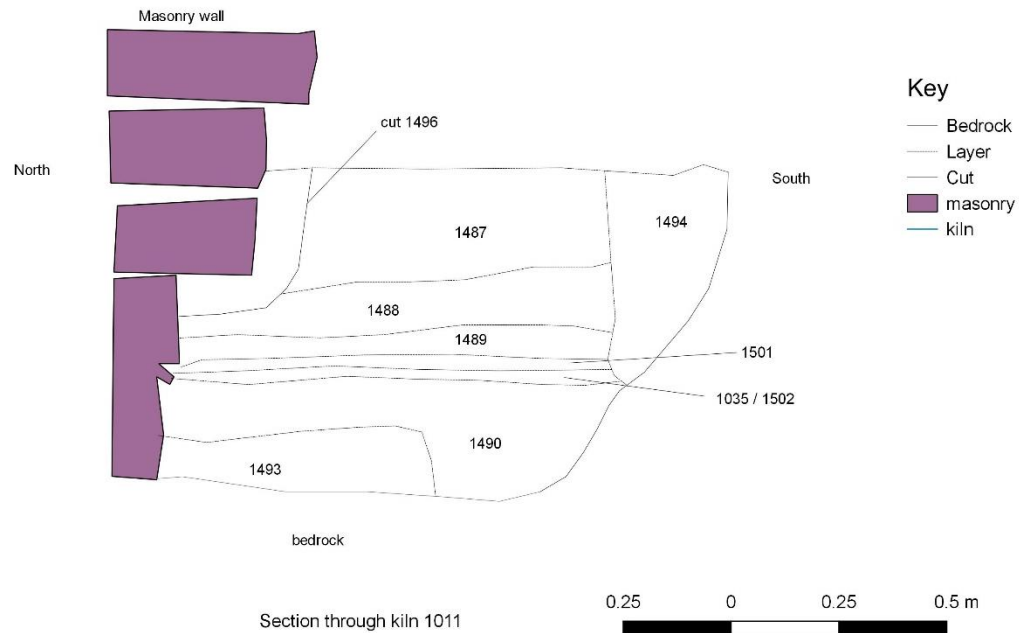
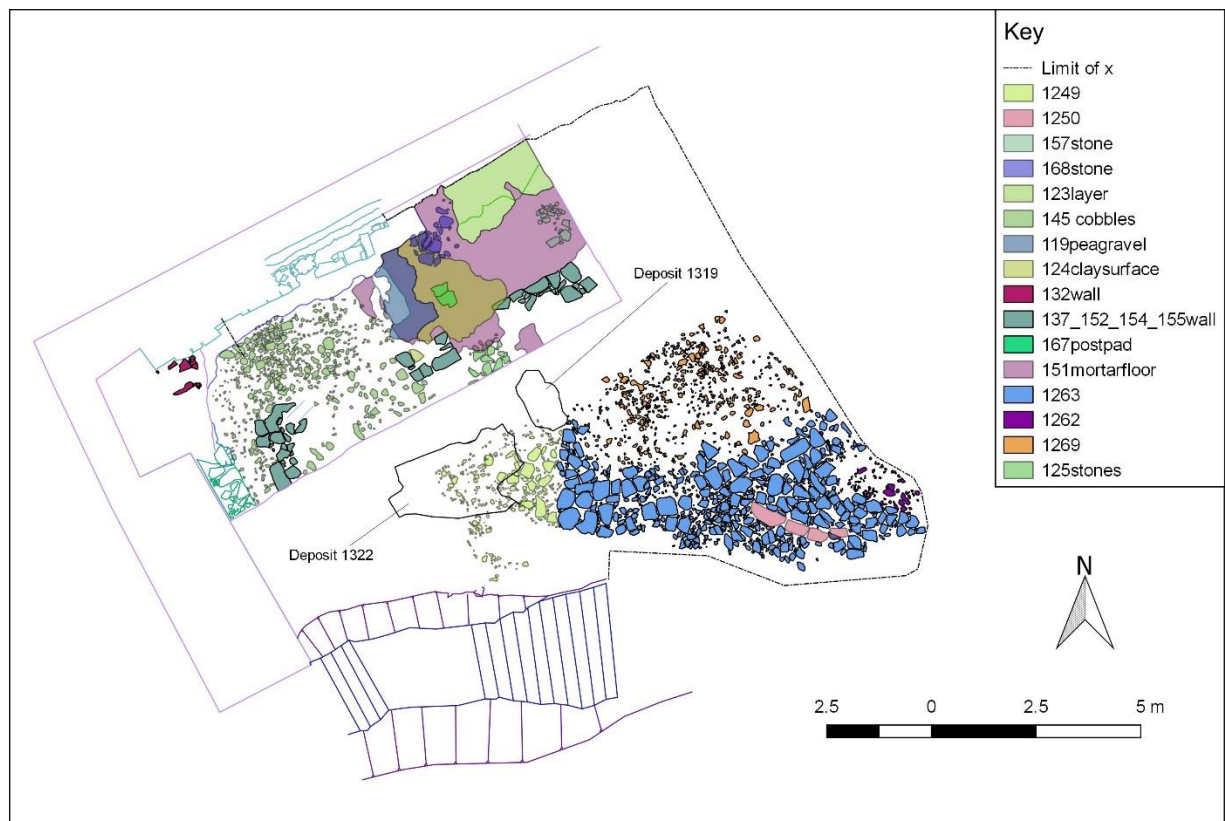


Figure 6: Kiln Section, Trench 1. Copyright BRP.

Late Early Medieval to 12th Century

Context 1319 (sample 200) was a burnt deposit dated to the early medieval period which may have been associated with lead-working (Young 2017, pers. comm.).

Context 1322 (sample 199) was a linear spread of uncertain date prior to the 12th century, but located in close horizontal proximity to where 1319 was excavated, centrally in Trench 1 (Young 2017, pers. comm.) (Figure 7). The density of macrobotanical remains in both samples is unknown. The samples share a mixed cereal crop assemblage of barley, free-threshing wheat and oat. Sample 200 is notable in that it contains one grain of rye, a remarkably high count of *Rumex sp.* seeds (220 seeds), charred unidentified buds and several possible tuber and/or rootlet fragments. It is possible that the buds and tuber/rootlet fragments are related to the *Rumex sp.* seeds but this is purely speculation as neither buds nor tuber/rootlets were identified further. A wide variety of other weed species are also present in this sample. *Potentilla sp.* and *Ranunculus flammula* are particularly well-represented here.



Trench 1 Phase 10 and 11 location of sampled features

Figure 7: Trench 1 Context Plan, Late Early Medieval to 12th Century. BRP Copyright.

12th Century to early 13th Century

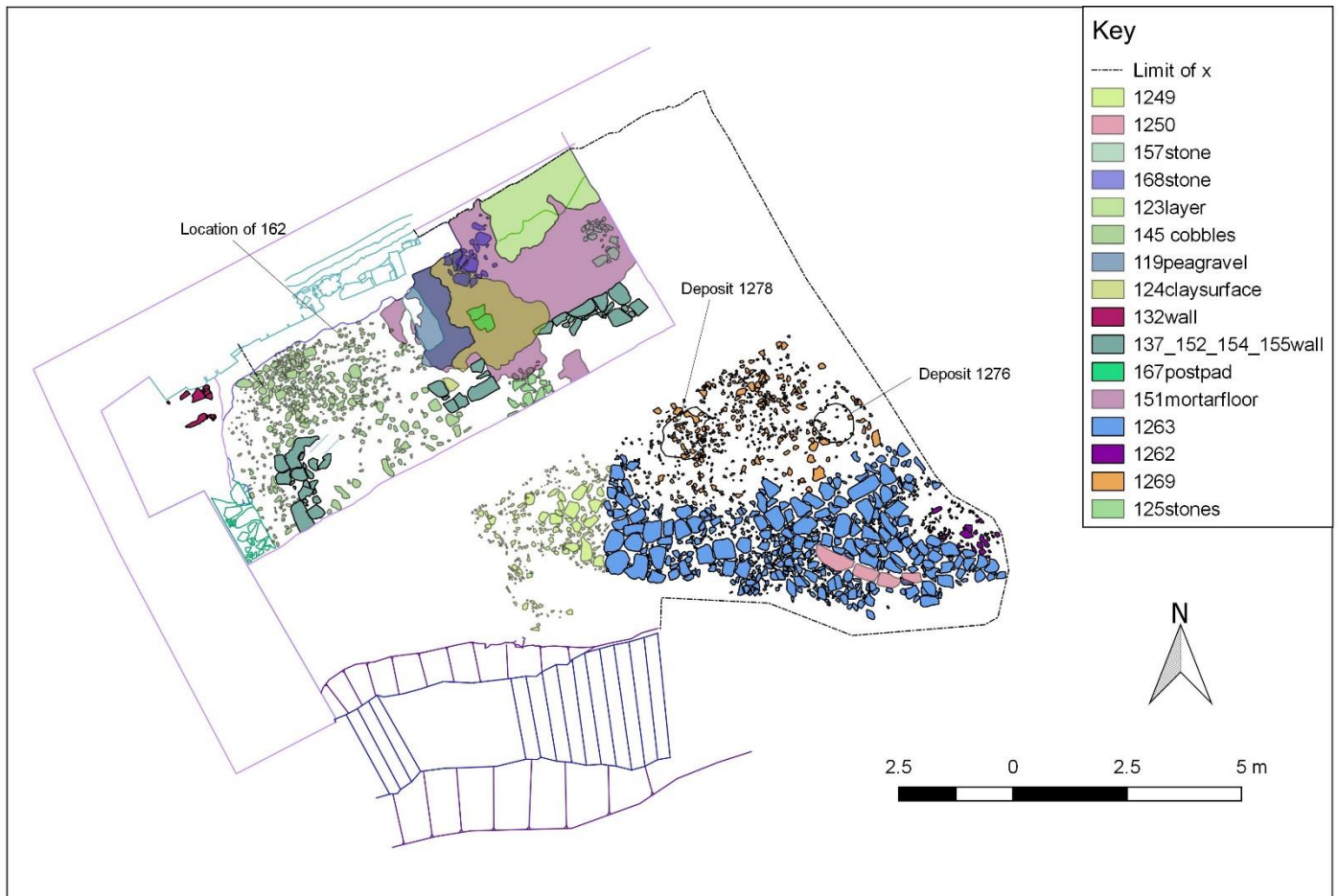
Context 1159 (sample 162) was the 12th-13th-century fill of a pit (context 177) containing several nails, located on the northwest side of Trench 1 (Figure 8). The density of macrobotanical remains in this sample is unknown but the cereal assemblage represents a pure free-threshing wheat crop (though a small number of barley and oat grains are also present) with a 0.5:1 ratio of wild seeds to free-threshing wheat grains. This assemblage is difficult to interpret but may represent crop-processing residues or partially cleaned grain.

Contexts 1276 (sample 193) and 1278 (sample 101) were located a couple of meters apart on the northeastern side of Trench 1, both featuring low densities of macrobotanical remains. Context 1276 was an ashy waste layer containing iron nails and a worked bone fragment. Context 1278 (sample 101) was the 11th-13th-century fill of a pit (context 1280), containing ferrous objects including horseshoe nails (Young 2017, pers. comm.). Sample 101 contained a mixed cereal assemblage dominated by free-threshing wheat and barley, while sample 193 contained the remains of a pure free-threshing wheat crop – the greatest representation of free-threshing wheat of the samples analysed in this study at 299 grains. The weed to crop ratio in this sample is 0.37:1. This assemblage likely represents a cleaned crop, deposited as waste in this layer.

Trench 1 Summary

The macrobotanical remains from Trench 1 show clear evidence of crop-processing activities, particularly the drying of oat during the late Anglo-Saxon period. The proportions of free-threshing wheat in Trench 1 samples seem to increase over time.

Free-threshing wheat is particularly dominant in the 12th-14th century phases with at least one sample showing evidence of a cleaned crop.



Trench 1 Phase 11 and 12 location of sampled features

Figure 8: Trench 1 Context Plan, 12th Century to 13th Century

6.6 West Ward Analysis Summary

Throughout the West Ward, barley and oat are the dominant crop species during the Early Medieval period but by the 12th century proportions of free-threshing wheat notably increase, becoming dominant in some Trench 1 samples. In support of this trend, the only pure sample analysed by Coutu (2007, 31) is a 12th-century sample of cleaned free-threshing wheat from Trench 1: sample 137, context 1098. Likewise, free-

threshing wheat is dominant in the only pure sample assessed by Huntley (2007, 4), dated to the 13th century: sample 325, context 3117, Trench 3. Interestingly, rye is somewhat glaringly lacking in the samples from Bamburgh. Rye has been found to be a common Anglo-Saxon crop, and one that grows reliably well in difficult weather conditions, which one might expect of northern England (e.g. Moffett 1994; Banham and Faith 2014). This analysis may have contributed to answering the question of whether or not the barley and oat remains at Bamburgh had been grown as dredge. Samples with a co-dominance of oat and barley were considered pure dredge crops for the purpose of the above analyses, and the wild seed to cereal grain ratios were calculated using the combined counts of both cereal species. All samples featuring this co-dominance were found to have high weed ratios, indicating that either the dredge was uncleaned (or a residue of crop-processing) in each case, or that the two taxa were mixed post-depositionally rather than grown together, as suggested by the singular dominance of oat in the grain-drying kiln samples.

Overall, the West Ward trenches demonstrate clear evidence of production activities both archaeologically and archaeobotanically, particularly in Trench 1 with regard to the processing of cereals. Documentary evidence for the later Middle Ages are very expressive of the desire to move industrial activities producing excessive waste, noise, fumes and noxious vapours to the peripheries of towns, settlements and estate centres (Rawcliffe 2013). It seems likely that the Early Medieval residents of Bamburgh had similar notions, if perhaps not for all the same reasons – the risk of fire accompanying these activities may have been sufficient. There may be some evidence of small-scale consumption of cereals in Trench 3 during the 9th-10th century, where oats may have

been stored or fed to animals such as horses. Small-scale cereal consumption may also be suggested in Trench 1 during the 12th-14th centuries by the presence of cleaned free-threshing wheat crop remains.

7. DISCUSSION

This section explores the general trends perceived in the charred plant remains studied from Bamburgh's West Ward to date. Here the macrobotanical data are integrated and applied to address research questions related to crop-processing, the centralization and redistribution of cereal resources, and to the nature of production and consumption in a high-status, rural context. The greatest source of evidence for these considerations at Bamburgh Castle is the kiln feature unearthed near Oswald's Gate, where large, statistically significant quantities of cereal grains were recovered in primary context. The function and economic roles of this feature are investigated in depth before moving on to broader research questions.

7.1 A Late Saxon Grain-drying Kiln at Bamburgh Castle

7.1.1 The Economic Functions of Grain-Drying Kilns

Grain-drying kilns have been found on archaeological sites throughout England, dating from the Romano-British through Anglo-Saxon and later medieval periods (Ross *et al.* 2016; Hamerow 2012). Determining the precise functions of these features in the archaeological record is not always straightforward. These features have been variably recorded – and at times ambiguously interpreted -- as “hearths”, “ovens”, “malting kilns/ovens”, “crop-drying kilns” or “grain-drying kilns/ovens” (e.g. Moffett 1989; Moffett 1994; Heaton 1992). The interpretation of Saxon kiln features at Chantry Fields

Gillingham for example, is particularly uncertain. These features are hypothesized to have been used for ore-roasting as well as grain-drying over the course of their use and multiple structural alterations (Heaton 1992, 97-126).

There are several junctures of the cereal processing sequence where a grain-dryer might be used. Depending on the moisture of the crop at harvest, the harvest would be left to air-dry or dried in a kiln to some extent before threshing (Hillman 1981, 134). This drying would typically take place on or near the site of harvesting (Ross *et al.* 2016). After threshing and raking, hulled cereals such as barley or oat may have been dried in a kiln prior to hummeling, to assist with the removal of the hulls (Hillman 1981, 134-135). After winnowing and sieving to remove the remainder of weed seeds and chaff, a crop would often be dried in preparation for storage or transport – to prevent it from germinating or growing mould (Hillman 1981, 134-134). According to an ethnographic study on grain-drying by Fenton (1978) in the Northern Isles, grain-dryers were also used to ripen crops in regions with short growing seasons (cited in Moffett 1994, 61). Cereals were also dried in preparation for grinding into flour or, in the case of oats and barley especially, into meal for pottages (Moffett 1994, 61). Experiments and ethnographic research have shown that parching grain prior to grinding makes the grinding process more efficient and also has an effect on the flavour of the flour (Moffett 1994, 61). Grain drying can also take place as part of the malting process for the brewing of alcohol (Ross *et al.* 2016, 245). During malting, germinated grains are often lightly roasted, though not so much as to kill the enzymes responsible for fermentation (Moffett 1994, 61).

7.1.2 The Bamburgh Grain-Drying Kiln: Structural Morphology

A grain-drying kiln likely dating between the 9th and 11th centuries was discovered in Trench 1 at Bamburgh Castle (Young 2016, pers. comm.). The feature appeared to be a single chamber constructed of clay, though it had been cut on two sides by later activity, perhaps obscuring its original shape (Young 2017, pers. comm.). A collapsed domed superstructure made from clay was recovered from the upper fill layers, and hollows for timber supports were also identified (Young 2017, pers. comm.). Interestingly, charcoal fragments were notably absent from the flotation samples. Wood charcoal in grain-dryers at other sites has been interpreted as the remains of collapsed wattle and daub superstructures (e.g. Ross *et al.* 2016; Stevens 2011, 99; Holden 2006). There is no evidence of any structure housing the feature, though it is possible that a small timber structure would not be recovered archaeologically (Young 2016, pers. comm.).



Figure 9: Bamburgh grain-drying kiln feature, half-section, 2016. Copyright BRP.



Figure 10: Bamburgh grain-drying feature, charred grain, 2016. Copyright BRP.

Structural Comparisons

Grain-dryers of varying structures have been identified at Anglo-Saxon sites. L-shaped kilns, consisting of a flue and drying chamber constructed of reused Roman tile and brick have been discovered at Mid to Late Saxon sites such as Chalton Manor Farm in Hampshire (Hughes 1984, 72-26). Meanwhile, keyhole-shaped kilns have been

recorded from Romano-British through to later Medieval sites (Ross *et al.* 2016). At times the original forms of these structures are obscured but are nonetheless interpreted as grain-dryers due to the presence of fired clay and charred cereals, such as at Late Saxon Springfield Lyons, Essex where what remains of a possible kiln structure is described as a “rectangular slot” within a building (Murphy 2005, 162). The relationship between form and function in relation to these features is poorly understood and would make for an interesting study in itself. Some recurring forms are here compared to the structural evidence from Bamburgh.

At St. Mary’s Grove, Stafford, four 9th-century keyhole-shaped “ovens” were identified, positioned in pairs with a cobble surface between them (Moffett 1994, 56). In each pair, one kiln contained a clay lining and superstructure while the other did not (Moffett 1994, 56). There was no evidence of the features having been contained inside a building of any sort (Moffett 1994, 56). At Chantry Fields, Gillingham two “ovens”, though of uncertain function (see above), were associated with grain-drying during the Anglo-Saxon period. These structures were stone-built with clay-lined central pits and stone-lined “side passages” (Heaton 1992, 101). At the earlier 5th-6th-century site of Goldthorpe in South Yorkshire two figure-of-eight-shaped dryers were excavated, each consisting of a firing chamber and drying chamber without clear evidence of a flue between them – similar to the keyhole-shaped type but lacking an obvious flue (Ross *et al.* 2016, 239-240). The Goldthorpe kilns appeared to have been covered by wattle and daub superstructures but lacked housing structures (Ross *et al.* 2016).

The Northumbrian ecclesiastical site of Hoddum, Dumfriesshire has yielded the most extensive evidence, to the author’s knowledge, of Anglo-Saxon grain-drying

(Lowe 2006). A total of fourteen kilns, including rebuilt or remodelled versions of kilns which had previously burned down, were excavated at Hoddum (Lowe 2006). These kilns were divided, according to their structures, into four types. Type 1 kilns consisted of clay-lined pits with wattle and daub superstructures, contained within large rectangular timber buildings and were constructed circa 650-850 C.E. (Holden 2006, 102). The pits were likely 1.0 to 1.6m in diameter and may have been attached to wattle and daub flues (Holden 2006, 105, 109). Type 2 kilns, with an estimated date range of c. 750-850 C.E., were free-standing kilns with stone footings and possible wattle and daub superstructures, contained within timber or timber and stone buildings (Holden 2006, 104-105). Type 3 kilns were characterized by their clay-lined stone bowls and stone flues and were housed within stone buildings (Holden 2006, 105-106; Lowe 2006, 92). Type 3 kilns are estimated to date between 800 and 1000 C.E., though a reconstruction of one example of this type, S11, may have been used as late as the 12th century (Holden 2006, 105-106). Lastly, Type 4 kilns, dated to c. 1000-1250 C.E., are concurrent with what is interpreted as a decline in the status of the site and perhaps a secularization of the portion of the site where these kilns are located (Holden 2006; Lowe 2006, 196-197). These Type 4 kilns are described as “pear-shaped” pits, bearing some resemblance to the figure-of-eight or keyhole-shaped structures recorded elsewhere (see above) (Holden 2006, 106-107). The sides of the pits were lined with wattle and daub while the floors were lined with clay. These kilns are thought to have included flues and may have had timber superstructures but no further housings were apparent (Holden 2006, 106-107).

The grain-drying kiln at Bamburgh, constructed of clay with a timber superstructure, lacking evidence of a flue or an encasing building and having a somewhat pear or figure-of-eight shape, seems to bear closest resemblance to the Romano-British Goldthorpe kilns and the Type 1 and Type 4 kilns at Hoddum (Young 2017, pers. comm.; Ross *et al.* 2016; Holden 2006). Unlike Hoddum's Type 1 however, the Bamburgh kiln did not show evidence of being lined with wattle and there is no suggestion of a flue or a containing building. The Bamburgh kiln contexts were remarkably free of wood charcoal fragments. The suggested 9th to 11th-century date for the Bamburgh kiln could fit within the earlier part of the date range assigned to the Type 4 Hoddum kilns (1000-1250 C.E.), though again there is little evidence for a wattle and daub lining. Both Ross *et al.* (2016) and Holden (2006, 107) with regard to Type 4 kilns, suggest that cereal grains may have been placed to dry on a platform of cloth or straw, supported by wattle poles on the drying floors of these kiln types. Given the similar morphology of the Bamburgh kiln to these types, it is likely that Bamburgh's grain-dryer functioned similarly.

Table 3: Macrobotanical counts extrapolated from the subsamples analysed from each kiln context in order to estimate the total quantities of remains in each sample. Each sample was subsampled by riffle-box. 1/8 of sample 248 was analyzed and 1/16 of each of the other kiln sample

| Extrapolation Table for Trench 1 Kiln Contexts | | | | | |
|---|-----------------------|---------------|----------------|----------------|---------------|
| Sample # | | 184 | 248 | 247 | 246 |
| Context | | 1035 | 1489 | 1488 | 1487 |
| Cereals | | | | | |
| <i>Avena sp.</i> | Oat | 4592 | 3016 | 3952 | 3760 |
| c.f. <i>Avena sp.</i> | | 2048 | 160 | 16 | 896 |
| <i>Avena sp.</i> grain with floret base | | 32 | | | 16 |
| <i>Avena sp.</i> floret base (no grain) | | 48 | 24 | | 64 |
| <i>Hordeum vulgare</i> (naked or hulled indet.) | Barley | | | 32 | 48 |
| <i>Hordeum vulgare</i> , hulled | | | | | 16 |
| c.f. <i>Hordeum vulgare</i> | | | | 16 | |
| <i>Hordeum</i> Twisted | | | 8 | | |
| c.f. <i>Secale cereale</i> | Rye | 16 | | | |
| <i>Triticum aestivo-compactum</i> | | 48 | 80 | 32 | 80 |
| c.f. <i>Triticum aestivo-compactum</i> | Free-threshing wheat | 16 | 24 | 16 | |
| Indet. cereal spp. | Indet. Cereals | 96 | 16 | 16 | 112 |
| Economic Pulse | | | | | |
| Fabaceae sp(p). | Indet. economic pulse | | | | 32 |
| <i>Vicia faba</i> | Celtic bean | | | | 32 |
| c.f. <i>Vicia sativa</i> | Common vetch | | | | 16 |
| Wild | | | | | |
| <i>Artemisia sp.</i> | Mugwort | | | 16 | 16 |
| Asteraceae | Asters | | | | 48 |
| <i>Atriplex sp(p).</i> | Orache/saltbush | 16 | 32 | 80 | 80 |
| Brassicaceae sp(p). | Crucifers | | | 16 | |
| <i>Brassica nigra</i> | black mustard | | | | 16 |
| Caryophyllaceae sp(p). | Carnations | | | | 16 |
| Chenopodioidae sp(p). | Amaranths | | 8 | | |
| <i>Chenopodium sp(p).</i> | Goosefoot | | | | 48 |
| <i>Chenopodium album</i> | Fat hen | | 24 | | 64 |
| Cyperaceae sp(p). | Sedges | | | | 16 |
| Fabaceae sp(p). | Wild pulses | | | | 48 |
| Fabaceae sp(p). (econ. or wild) | Pulses indet. | | | 80 | |
| c.f. Geraniaceae spp. | Geranium family | | | | 32 |
| <i>Glebionis (Chrysanthemum) segetum</i> | Corn marigold | 16 | 88 | 64 | 768 |
| <i>Hyoscamus niger</i> | Black henbane | | | | 32 |
| <i>Lens sp.</i> | Lentil | | | | 16 |
| <i>Linum sp.</i> | Wild flax | | | | 48 |
| c.f. <i>Pisum</i> | Pea | | | | 16 |
| Poaceae spp. | Grasses | 1536 | 720 | 3824 | 2032 |
| <i>Raphanus raphanistrum</i> (fruit) | Wild Radish | 32 | 32 | 32 | |
| <i>Rumex sp(p).</i> | Dock | | 8 | 16 | 16 |
| <i>Scirpus sp./Eleocharis sp.</i> | Sedge | | | | 16 |
| <i>Spergula arvensis</i> | Corn spurry | | | | 16 |
| <i>Stellaria media</i> | Chickweed | | 8 | | 32 |
| Trifolieae sp(p). | Clovers/Medicks | | | | 16 |
| <i>Vicia c.f. sativa</i> | Common vetch | | | | 16 |
| c.f. <i>Vicia sp.</i> | Vetch | | 24 | | 16 |
| Wild indet. | Wild indet. | 16 | | 112 | 160 |
| Total Seeds | | 8512 | 4272 | 8320 | 8656 |
| Sample Sediment Volume (L) | | 9 | 2 | 7 | 82 |
| Preserved items per litre | | 945.78 | 2136.00 | 1188.57 | 105.56 |

7.1.3. The Bamburgh Grain-Drying Kiln: Macrobotanical Remains

Multiple fill layers were recovered from the grain-drying kiln: contexts 1035, 1488 and 1489. Context 1487 is defined as a demolition layer from the top of the grain-drying kiln. These four contexts associated with the grain-dryer are dominated by oat grains, making up 90% to 97% of the fill layer assemblages (Figure 11). By extrapolating the counts from the subsamples studied from each kiln context, between approximately 3200 and 6600 oat grains were estimated to have been recovered from each kiln layer (Table 3). Free-threshing wheat and barley are only scarcely represented. Wild seeds are present in small quantities, making up 1% to 8% of the contents of the fill layers. The demolition layer 1487 is distinguishable from the fill layers in its higher proportion of wild seeds (28%), as well as the inclusion of a few potentially economic pulse specimens, including *Vicia faba* and c.f. *Vicia sativa*, making up 1% of the assemblage. These additional weeds in context 1487 may have joined the assemblage during the collapsing and burning of the kiln, given that this is the demolition layer. Alternatively, the crop being dried at the time of collapse may have been less thoroughly cleaned than the others recovered from the kiln.

Macrobotanical Comparisons

Just as there is variety in the structure of Anglo-Saxon grain-dryers, the macrobotanical signatures from within these kilns is also varied, though not necessarily in correlation with the different kiln forms – again, this would make for a separate, though very interesting study, for which there may not yet be enough evidence.

At the Late Saxon settlement at Springhead, Kent, two “crop-dryers” were excavated wherein the predominant crop was free-threshing wheat, followed by hulled barley (Stevens 2011, 95-96, 99). Rye was also present as a cultigen, though only 10% of the remains were identified as rye (Stevens 2011, 95). Oat was scarcely represented in the kilns and is interpreted as a weed of cultivation rather than a crop species (Stevens 2011, 95). Stevens (2011, 99) concludes, based on the absence of rachis fragments and low proportion of large weeds seeds, that the crops had been subjected to threshing, winnowing, coarse-sieving and raking but perhaps not fine-sieving, given the presence of small wild seeds. Although free-threshing wheat and rye are known to have been grown together as maslin, barley is not known to have been grown alongside either species. Therefore, the mixture of cereals within these driers likely represents multiple drying events (Stevens 2011). One of the Springhead dryers contained a few specimens of economic pulses (*Vicia faba* var. *minor* and *Lens culinaris*) (Stevens 2011, 95). The presence of lentil here is deemed a local cultivation rather than an import (Stevens 2011, 98). These economic pulses could have been remnants of a previous drying event in the kiln but may also represent contaminants within the cereal harvest. Wild seeds were well-represented in this dryer as well (Stevens 2011, 96-97). Scarce remains of potentially economic pulses were also recovered from one of the layers from the Bamburgh kiln (context 1487) (see pie chart). Interestingly, this same context also contains the highest weed proportion of the Bamburgh kiln layers. This correlation may support the possibility that the legume remains are contaminants in these contexts. Overall, the Late Saxon grain-dryers at Springhead are interpreted as being used to dry grain, particularly free-threshing cereals, in preparation for storage (Stevens 2011).

At St. Mary's Grove, Stafford four mid-9th century "ovens" were identified (Moffett 1994). Rye chaff appears to have been used as fuel in all four of these features (Moffett 1994 58-59). *Triticum sp.* grains dominate the fill of one of these ovens, rye another and oat grains dominate the remaining two (Moffett 1994, 60). In the ovens where oat is dominant, very little oat chaff was recovered but these samples contained high proportions of weed seeds (Moffett 1994, 60). Moffett (1994, 62-63) suggests that the large quantities of oat may have been used for fodder, perhaps for feeding horses which are considered to have been a "luxury animal", and therefore the oats did not require thorough cleaning.

The use of oats is considered similarly at Rocester, Stafford where three Saxon kilns were investigated (Moffett 1989). The macrobotanical assemblage in one oven was co-dominated by oat and free-threshing wheat, though in low numbers of each. One feature contained predominantly barley and another oat. The dryer dominated by oat grains also contained the highest proportion of wild seeds (16% wild seeds, 44% oat) (Moffett 1989, 17). Quantities of oat chaff were not recorded quantitatively in Moffett's (1989, 9) report but were described as low.

At the Romano-British site of Goldthorpe in South Yorkshire, the 5th-6th-century grain-drying kilns contained mostly barley and free-threshing wheat but few oats (Ross *et al.* 2016, 241-242). Ross *et al.* (2016, 243) conclude that the scarcity of oat in these kilns is either due to oat being cultivated to a lesser extent than the other cereals, or that oat was being used for fodder and therefore did not require the same level of drying. However, presumably fodder would require long-term storage as much as cereals for human consumption and therefore if oats at Goldthorpe were being used for fodder, they

would have undergone drying in considerably quantities as well. Though if oats were the main fodder cereal and the number of animals to be fed were few, it may make sense for the quantity of oats dried to be lower than that of the cereals destined for human consumption. The sparsity of weed seeds and chaff in the kilns suggests that the processes of chaff and weed removal took place prior to drying and that these grains were being prepared for storage or transport (Ross *et al.* 2016, 243). Although the assemblage in the Bamburgh kiln is predominantly oat, the paucity of wild seeds and chaff is similar to that noted at Goldthorpe.

At Hoddum, Dumfriesshire the earlier kilns (dating to c. 650 – 1000 C.E., prior to the Type 4 kiln constructions) contained very clean black oat (*Avena strigosa*) crops, suggesting that the drying was being conducted in order to prepare the grains for storage, milling or transportation (Holden 2006, 155). Holden (2006, 155) interprets the fills of the later Type 4 kilns, which were also dominated by oat but contained high proportions of weed seeds, as grains dried in preparation for hummeling. According to Hillman (1981, 134-135), hummeling of hulled grains such as hulled barley and oat would take place just prior to winnowing, followed by sieving (and the removal of weed seeds). The charred contents of the Bamburgh kiln are similar in makeup to those of the earlier kilns at Hoddum. Although quantitative data for each kiln structure was not included in the Hoddum archaeological report (Lowe 2006), the data provided for Type 3 kilns S11.2 and S11.3 are comparable to the findings at Bamburgh (Table 4; Figure 11).

| Macrobotanical Comparison: Hoddum Type 3 Kilns vs. Bamburgh Kiln | | | | | |
|---|------------|--------------|---------------|------------|-------------|
| | Oat | Wheat | Barley | Rye | Wild |
| Hoddum S11.2 | 58-63% | 10-14% | 10-16% | 2-3% | 5-19% |
| Hoddum S11.3 | 55-70% | 21-36% | 1-3% | 4-6% | 1-3% |
| Bamburgh Kiln | 67%-97% | 1-3% | 0-1% | 0% | 1-27% |

Table 4: Comparison of proportion ranges for cereals and wild species at Hoddum Kilns S11.2 and S11.3 and the Bamburgh Kiln. Note that the low end of the Bamburgh oat range (67%) and the high end of the Bamburgh wild range (27%) represent the demolition layer of the kiln, context 1487. The three kiln fill layers range between 90% and 97% oat and between 1% and 8% wild seeds.

Samples from S11.2 contained a macrobotanical assemblage of 58% to 63% oat grains (1,741 and 328 total grains, respectively) and 5% to 19% wild seeds (28 and 564 seeds, respectively) (Lowe 2006, 85). S11.2 samples also contained 10-16% barley, 10%-14% free-threshing wheat and 2%-3% rye (Lowe 2006, 85). S11.3 samples contained 55% to 70% oat grains (29, 256 and 18, 137 grains, respectively) and only 1% to 3% wild seeds (40 and 663 seeds, respectively) (Lowe 2006, 88). S11.3 samples are also 21%-36% made up of wheat, 4%-6% rye and 1% to 3% barley (Lowe 2006, 88). Although oats make up a significantly higher proportion of the kiln fill layers at Bamburgh (contexts 1035, 1488 and 1489) at 90% to 97%, the demolition layer excavated from the top of the Bamburgh kiln (context 1487) was 67% oat – an equivalent proportion to that found in the Hoddum kilns. The three Bamburgh kiln fill layers contain 1% to 8% wild seeds while the demolition layer contains a higher proportion at 27%, both ranges being fairly in keeping with the wild component of the Hoddum samples. Free-threshing wheat

makes up a significantly smaller proportion of the Bamburgh kiln samples, while the amount of barley is equivalent to what was found in Hoddum's S11.3 (Table 4). While rye is very scarcely represented at Hoddum, it is entirely absent in the Bamburgh kiln remains. Hoddum kilns S11.2 and S11.3 date between c. 800 and c. 1000 C.E., which is concurrent with the suggested date for the Bamburgh kiln (Holden 2006, 102; Young 2016, pers. comm.).



Figure 11: Proportions of macrobotanical categories in Trench 1 kiln samples. Quantities based on counts in Table 1.

7.1.4 Interpretation of the Bamburgh Kiln: Function and Economy

As discussed above, different functions have been suggested for structures such as the one represented by contexts 1035, 1487, 1488 and 1489 at Bamburgh Castle. Comparison to similar, roughly contemporary structures across the United Kingdom confirms that the Bamburgh kiln feature was used for drying grain as part of crop-processing rather than being used for food-production activities such as baking bread or brewing alcohol. A beautiful, stone-built malting oven dating to the mid-8th to mid-9th century was uncovered at Higham Ferrers, Northamptonshire (Hardy *et al.* 2007, 48-51). The macrobotanical contents of this feature were 90% hulled barley grains and approximately a quarter to a half of these had demonstrably germinated (Moffett 2007, 162-163). Although oats are also thought to have been used for malting (Murphy 2009), not one grain from the Bamburgh kiln could be identified as germinated.

Within the sequence of cereal crop-processing, there are multiple junctures at which a grain-dryer such as the Bamburgh kiln might be used, which vary to some extent according to the cereal being processed (Hillman 1981, 134-135). The Bamburgh kiln shows definite evidence for the drying of only one cereal crop taxon: oat. The mixture of cereal taxa at Goldthorpe, Springhead and Chalton, for example, is indicative of multiple firings and the mingling of the accumulating remains of successive firings (Ross *et al.* 2016; Stevens 2011; Hughes 1984, 72). Grain-drying kilns were likely raked out at varying frequencies and the state of ‘cleanliness’ preserved in each kiln is dependent on when in relation to cleaning-day the structure went up in flames. The process of raking out a kiln would add to the mingling of accumulated layers and even the most thorough cleaning would likely leave some remnants of that mixture behind

(Ross *et al.* 2016, 242-243). At Hoddum, the dominant cereal taxon in each kiln was interpreted as the crop being dried at the time of the structure's conflagration, while the minor cereal taxa are interpreted as the accumulated remains of previous drying events (Holden 2006, 155). Although multiple fill layers have been identified within the Bamburgh kiln, they are each clearly dominated by oat (Figure 11). Remains of other cereal taxa within these layers are very scarce, each making up 0% to 3% of each context. If these anomalous remains of barley and free-threshing wheat represent the remains of prior drying events, the kiln must have been very thoroughly cleaned preceding the firing of the oats. Alternatively the barley grains at least could represent contaminants in the oat crop, as were both spring-sown cereals (Campbell 2007). The successive layers of oat could represent different firings or at least accumulations of firings over time. In either case, the successive layers of pure oat are indicative of the repetitive drying of oat crops.

The proportions of chaff and weed seeds in these oat-rich layers are helpful for assessing the processing stage for which these oats were being dried (van der Veen 1992, 82). The ratio of oat florets to grains is very low in the Bamburgh kiln samples. Florets were present for 0% to 2% of the identified oat grains (Table 1). Wild species (discounting the indeterminate Poaceae, much of which likely contributed to the oat crop) are likewise very scarce at 0% to 8% of the kiln fill layers (Figure 11). It should be noted that a scarcity of chaff material is not necessarily proof that the grains were previously cleaned, as chaff does not preserve well through charring (Hamerow 2012, 155). It is however likely, especially combined with the scarcity of weed seeds, that these remains represent a highly cleaned crop. This assemblage is very similar to those

of the early medieval kilns at Hoddum, though even fewer chaff remains were recovered from Bamburgh. Holden (2006, 151) does not describe the proportion of oat chaff remains in each kiln, though he does say that hundreds of grains were identifiable by their florets to *Avena strigosa* across the site, alongside about sixty florets of *Avena sativa*. Even after extrapolating the grain and chaff quantities from the Bamburgh kiln subsamples, an estimate of merely 184 *Avena sp.* florets to 18, 488 grains were likely preserved (Table 3). In contrast to this, Holden (2006, 155) interprets the fills of the later Type 4 kilns at Hoddum, which were also dominated by oat but contained high proportions of weed seeds, as grains dried in preparation for hummeling rather than a later stage of drying.

At some sites (see above) oat-dominant kiln layers were interpreted as fodder crops due to high representations of weeds (e.g. Moffett 1994, Moffett 1989). In absence of further evidence such interpretations should be made cautiously, as a high proportion of weeds may merely signify a crop being dried prior to hummeling and does not necessarily provide evidence toward its intended destination after processing. Likewise, although the oats at Bamburgh are very clean of weeds and chaff, this does not entirely exclude the possibility of its use for animal feed, although many studies assume that grains for fodder were not as thoroughly cleaned (e.g. Moffett, Ross *et al.* 2016). There may be documentary evidence that could shed some light on the processing of animal feed.

The peripheral location of the grain-drying kiln at Bamburgh – located in the far West corner of the West Ward, next to Oswald’s Gate – is to be expected. Documentary sources (including early Irish laws) indicate that grain-dryers were placed at a distance

from residential areas because they were a fire hazard (Hamerow 2012, 155).

Archaeological evidence such as the grain-dryers at Hoddum demonstrate that these structures burned down often, at times being rebuilt only to burn down again (Holden 2006, 154). The separation of these features from other main activity areas has also limited their discovery archaeologically (Hamerow 2012, 155). Interestingly, the kilns located at St. Mary's Grove Stafford are thought to be centrally located in the Late Saxon settlement, though St. Mary's Grove's place as a centre for cereal processing and storage appears to date back to the Iron Age (Moffett 1994, 56).

In form, the Bamburgh kiln shows similarities to the Romano-British figure-of-eight-shaped kilns at Goldthorpe, South Yorkshire and the pear-shaped c. 1000-1250 C.E. Type 4 kilns at Hoddum, Dumfriesshire, both of which are associated with rural, relatively low-status secular settlements in northern England and what is now southern Scotland (Ross *et al.* 2016; Holden 2006). It is unclear as to whether the particular morphological style of the kiln is of great relevance to its function, as differently-shaped kilns at other sites appear to have been used for equivalent purposes (see above). In spite of the varied structures of the three Saxon kilns found at Rocester, Staffordshire no distinction in their function could be identified, at least on the basis of the macrobotanical remains (Moffett 1989, 10). The choice of structure may therefore be more related to the materials available, or to cultural associations, though this cannot be assessed without more in-depth study on grain-drying kiln morphology across the British Isles. While the majority of other sites compared here contained between two and fourteen grain-drying kilns, only one has been located at Bamburgh so far. Further excavation may uncover additional kilns but if the structure is indeed alone, this may

speak to a limited requirement for grain-drying at the site in comparison to many of the settlements discussed above. It is possible that the majority of cereal crops were imported, already dried in preparation for transport and storage, to the site from other settlements.

Macrobotanically, the kiln samples at Bamburgh most resemble those recovered from the Northumbrian ecclesiastical centre of Hoddum, particularly from the Type 3 kilns (Lowe 2006; Holden 2006). The Bamburgh kiln assemblage represents the drying of cleaned oat crops, likely just prior to storage or transport. The plant remains cannot confirm that the kiln was used to dry other cereal taxa, though the possibility is hinted at by the few specimens of winter-sown free-threshing wheat, which are unlikely to have been harvested as contaminants in the spring-sown oat crop. The few free-threshing wheat and barley grains could however have entered the assemblages by being mixed on threshing floors or other processing areas prior to being placed in the kiln (Jones and Halstead 1995; Holden 2006, 155). The lack of free-threshing wheat in the kiln is notable in the face of the cereal's reputation as both a high-status grain and one that is thought to have developed prominence over the Anglo-Saxon period (Stevens 2011, 97; Banham and Faith 2014). Kilns at Chantry Fields and Springhead, for example, contained dominant quantities of free-threshing wheat (Ede 1992, 121-122; Stevens 2011). Although traditionally not considered as important a cereal to the Anglo-Saxon economy, oats are found in large proportions in several Saxon grain-drying kilns, such as at Hoddum, St. Mary's Grove Stafford, Rocester Stafford and Manor Farm, Chalton – and now Bamburgh Castle (Holden 2006, Moffett 1994, Moffett 1989).

Although the processing of free-threshing wheats does not include the extra drying step for hulled cereals prior to the hummeling, drying is an important part of processing free-threshing wheats, being particularly vulnerable to pests and mould (Stevens 2011, 98). The near absence of free-threshing wheat from the Bamburgh kiln could indicate that

- a) free-threshing wheat did not play a large role in the economy at Bamburgh at the time,
- b) free-threshing wheat was not processed in this particular kiln – there may have been other kilns elsewhere on site for this purpose
- c) free-threshing wheat was imported from another site/sites, already dried in preparation for transport to Bamburgh (the Goldthorpe kilns demonstrate that some grain-dryers were located next to agricultural fields during the 5th-6th centuries, indicating that cereals were, rather efficiently, being dried directly at the fields where they were harvested (Ross *et al.* 2016, 239)),
- d) or that the kiln burned down during oat-harvesting season. The limited representation of cereals in the kiln could be indicative of the seasonality of the burning event. Radio-carbon dating of each of the layers within the kiln may be of assistance in discerning whether the different layers of oat represent firings over a long duration of time or within a much shorter period.

7.2 Cereal Processing at Bamburgh

The majority of sites identified as performing centralized crop-processing and storage functions during the Anglo-Saxon period are estate centres, both secular and ecclesiastical, as well as towns (Hamerow 2012, 153-154). Expectations of such

functions accompany our understanding of Bamburgh Castle's identity as a secular estate centre, with links to the monastic centre of Lindisfarne.

The discovery and interpretation of a grain-drying kiln contributes to contextualising Bamburgh Castle's role in cereal processing. The *Gerefa*, an 11th-century document which describes the responsibilities required to manage a Saxon estate, lists the construction of a kiln at the threshing floor among those responsibilities (Hughes 1984, 72-73). The so far solitary presence of this kiln is only indicative of small-scale processing taking place on site, suggesting self-supplying cereal processing but not on a sufficient scale to propose any redistributive function. In contrast, excavations at the Northumbrian ecclesiastical site of Hoddum, Dumfriesshire uncovered a total of fourteen grain-dryers, at least eight or nine of which fit within the suggested 9th- to 11th-century date range for the Bamburgh kiln (Lowe 2006; Holden 2006, 102). Hoddum is interpreted a site of centralized crop-processing and possibly redistribution of cereals (Lowe 2006, 192-195). The structural form of the Bamburgh kiln may also be indicative of its small-scale function: of the kilns considered in this study, the Bamburgh kiln most resembles the latest phase of Hoddum dryers which are associated with a secularization of the site and a decline in status, where the kilns would have functioned on a more limited scale, perhaps to supply a small farming community (Holden 2006, 155). Bamburgh also bears similarity to the Romano-British Goldthorpe kilns, which are interpreted as evidence of low-status, rural agricultural production and processing rather than centralized or redistributive functions (Ross *et al.* 2016).

The majority of cereal grains may have been brought already cleaned and dried to Bamburgh from surrounding estate centres such as Yeavinger, as is hypothesized with

regards to livestock (Loveluck 2013, 144; Hope-Taylor, 1977). Coutu's analysis of the weeds of cultivation accompanying the cereals at Bamburgh indicates that crop-fields with different environmental signatures (regarding soil quality and climate) likely contributed to Bamburgh's supply of cereals (Coutu 2007, 48). The macrobotanical evidence demonstrates that at least some cereal products were brought to the site as whole grains rather than flour. Evidence for on-site production of flour includes quern fragments unearthed from 8th- and 9th-century deposits in Trench 3, leading Young (2017, pers. comm.) to hypothesise that hand-turned rotary querns were used on site. It is also possible that watermills were used for milling grain for the fortress. Early medieval horizontal watermills are known, for example at the Northumbrian royal site of Corbridge, and the Mill Burn stream that runs through the village of Bamburgh may have been a suitable location for such a mill (Young 2017, pers. comm.). There was a Saxon mill at Springfield, Kent, a site where two Late Saxon grain dryers were identified (Andrews et al. 2011). Manual grinding using quernstones tends to be associated with smaller, domestic sites over this period while water mills are especially associated with royal estates in documentary sources (Hamerow 2012, 152, 154). It is therefore possible that grain milling also took place on the estate more generally rather than merely at the site of the fortress itself. As of yet, Bamburgh Castle has also not yielded evidence of large-scale cereal storage. It is possible that such stores would have been kept in a more central location however, perhaps in the Inner Ward. Although there is not a lot of evidence for Anglo-Saxon grain storage areas throughout England, Higham Ferrers is one example where the quantities of grain recovered suggest that

cereals were being kept for use beyond the estate centre – perhaps for sale or redistribution (Hamerow 2012; Hardy *et al.* 2007).

7.3 Cuisine at Early Medieval Bamburgh: on Food and Fodder

7.3.1 Oats

In spite of the reported scarcity of oat among Anglo-Saxon sites in comparison to free-threshing wheat and barley (Banham and Faith 2014, 31), Bamburgh Castle is not alone in its high representation of oat during the Early Medieval period. For example, the dominant cereal recovered at Hoddum from this period was oat (*Avena strigosa*). Farther south, at the Late Saxon settlement at Springfield Lyons, *Avena sp.* was the most frequently-occurring cereal across the site, though *Triticum spp.* (not identified beyond genus) was also quite well represented (Murphy 2005). Oats were recovered in especially high frequencies in samples from Late Saxon Building 6, which is interpreted as a possible fodder-storage building, destroyed by fire (Murphy 2005, 160).

An Early Medieval building discovered at Foundation Street, Ipswich contained a large, semi-cleaned assemblage of oats as well as artefacts associated with horses: namely a horseshoe and spur (Murphy 1987, 32-38). This assemblage, given its context, is interpreted as a fodder store rather than a stable, given the absence of dung and related insects (Murphy 1987, 32-38). The oats in this assemblage were well cleaned, with low proportions of chaff and weeds, which Murphy (1987, 38) interpreted as an indication of the value of horses. The chaff to grain ratio for the entire assemblage in this building is 0.26:1, however there may have been a separation of sterile floret bases and under-

developed or germinated seeds to one corner of the building, suggesting either that some crop-processing took place or that chaff was intentionally stored in the building as well (Murphy 1987, 34). Chaff is nearly entirely absent from the oat assemblages at Bamburgh Castle. There is considerable evidence for the keeping of horses at Bamburgh: horseshoe nails have been recovered from Trenches 1 and 3 and there are textual references to stables at Bamburgh in the later medieval period (Young 2017, pers. comm.). A spur and horseshoe fragment were also collected from an Early Medieval to 12th-century layer in Trench 8. As determined in the Analysis section, the 9th-10th-century timber building on the western end of Trench 3 may have stored oats – uncleaned, in comparison to the highly cleaned kiln assemblage – to be fed to horses.

Significant quantities of oat on Anglo-Saxon sites, whether in drying or storage contexts, are almost invariably interpreted as fodder rather than for human consumption (e.g. Moffett 1989, Moffett 1994, Murphy 2005). For example, Moffett (1989, 10) interprets an uncleaned oat layer in a Late Saxon grain-dryer at Rocester, Staffordshire as a fodder assemblage. However, Moffett did not take into account the possibility that the oats were being dried just before hummeling, a process which would have taken place prior to several of the weed-reducing crop-processing stages, in which case the oats would have been later cleaned and could have been used for a variety of purposes, including human consumption (Hillman 1981, 134-134).

Oats may have been intended for human consumption at Bamburgh as well as for fodder. Oats can tolerate poor soil and wetter climates than are tolerated by free-threshing wheat (Moffett 1994, 63; Banham and Faith 2014, 32). In years of poor environmental conditions and therefore poor harvest, cereals of lesser quality that would

otherwise be used for fodder may have been incorporated into the human diet in larger proportions than in years of good harvest. In this way, the distinction between fodder crops and those for human consumption is a fluctuating one (Jones and Halstead 1995, 111). Intended human consumption of the oats recovered from Hoddum is deemed likely (Holden 2006). There is also evidence for the use of oats alongside barley for malting, such as at Late Saxon Norwich Castle and Early Medieval Buttermarket, Ipswich (Murphy 2009, 189). Germinated grains were not identified in any of the studies of Bamburgh's West Ward to date, however (Huntley 2007; Coutu 2007).

7.3.2 Free-threshing Wheat

Within the Anglo-Saxon period, we can see a transition from hulled to free-threshing corn: free-threshing bread wheat emerged by the end of the period as the most popular of all the cereals, found on 73 per cent of sites in the tenth and eleventh centuries (up from 38 per cent in the fifth to seventh centuries and 50 per cent in the eighth and ninth) (Banham and Faith 2014, 28).

Banham's research also demonstrates a decrease in barley over the period, concluding that the Anglo-Saxon period saw a replacement of barley with free-threshing wheat. Banham suggests that this is linked to an increase in the preference for the consumption of breads over the period, in comparison to other cereal-based foods (Banham and Faith 2014, 28). It is important to note that the pattern identified here is based on the presence or absence of free-threshing wheat on archaeological sites and

does not account for the *quantities* and relative proportions of cereal species. Therefore the extent to which free-threshing wheat was included in the diet is not considered.

As described in the Analysis section, an increase in the representation of free-threshing wheat *Triticum aestivo-durum* in the later contexts at Bamburgh Castle, particularly by the 12th century, has been noted. Although the investigation of further samples would be required to properly determine and quantify this possible shift, some potential contributing factors are considered here. Firstly, the rising of average temperatures during the medieval warming period of the 9th to 13th centuries could have made eventually made the northern English climate more conducive to growing free-threshing wheat (Banham and Faith 2014, 34). The concurrence of Norman rule and the perceived increase in free-threshing wheat representation at Bamburgh could indicate a shift in traditional economic connections, providing Bamburgh with farther-reaching agricultural exploitation over time. Bamburgh may have gained access to harvests grown farther south, where growing conditions were more amenable to free-threshing wheat. The growing importance of a market economy may also have resulted in the Castle purchasing these grains rather than relying on rents from surrounding northern lands.

7.3.3 High-Status Consumption

In spite of documentary and archaeological evidence for the importation of exotic plant foods such as fruit and spices into England during the Anglo-Saxon and Anglo-Norman periods (see Nightingale 1995, 6-22; McCormick 2001; Loveluck 2013), there is no archaeobotanical evidence of the accessibility of such high-status foodstuffs

at Bamburgh Castle. The absence of such remains is not entirely shocking when compared to contemporary, rural, high-status estate-centres such as Staunth Meadow, Brandon or Flixborough, and the northern castle sites of Dunbar and Edinburgh, which were also lacking in this regard (Murphy and Fryer 2014, 313-330; Hall, A. 2000; Perry 2000; Driscoll and Yeoman 1997). Although Dunbar Castle in particular shows many high-status parallels with Bamburgh Castle, comparison of the plant remains between the two sites was not particularly fruitful. Unfortunately, the plant remains collected from Dunbar for the early medieval period are so scarce that they only serve to establish the presence (not crop dominance or processing activities) of barley, oat and wheat (*Triticum sp.*) on the site (Fairweather 2000, 280-282). At Norwich Castle, Murphy (2009, 354, 443) notes the absence of expected high-status macrobotanical deposits during and after the establishment of the Anglo-Norman castle. In terms of cereals, the macrobotanical assemblage contemporary with the founding of the castle in the 11th century continued to be dominated by oat and barley (Murphy 2009, 354, 443-444). However, the absence of high-status plant remains at Bamburgh at least, may be more associated with sampling than medieval access. Study of these macrobotanical remains can confirm that the West Ward trenches were not the main consumption areas within the fortress. The majority of any fruits or spices that may have been present would have been stored and consumed in the Inner Ward. Overall, Bamburgh Castle's identity as a "high-status" site over the 9th through 12th centuries is not in question, though our understanding of "high-status" with regard to plant consumption over this period may be underdeveloped.

8. CONCLUSIONS

The period between the 9th and 12th centuries, is not a well-understood section of Northumbria's history (Young 2015). This study, examining charred plant remains from Bamburgh Castle's West Ward, provides an environmental approach to better understanding this period from the perspective of a high-status secular site. This project has contributed to filling gaps in England's archaeobotanical data both chronologically and geographically, as have been identified by van der Veen *et al.* (2013).

Archaeological evidence for the processing of cereals in the Anglo-Saxon period, although increasing, is not extensive (Hamerow 2012, 155). The evidence provided by the Early Medieval grain-drying kiln contributes to our understanding of crop-processing over the period, as well as to the role of Bamburgh Castle in the network of crop processing, centralization and distribution to which it belonged. Although a comprehensive comparison of all relevant grain-drying kilns was well beyond the scope of this study, a selection of roughly contemporary grain-dryers were compared with the Bamburgh kiln in an attempt to better understand its function and role in the economy of late Anglo-Saxon Bamburgh. The Northumbrian ecclesiastical site of Hoddum, located in what is now Southwestern Scotland, provides the closest comparisons to the grain-dryer at Bamburgh that the author has encountered in her research, chronologically, structurally and macrobotanically (see Lowe 2006). Structural similarities were also noted in the Romano-British kilns at Goldthorpe, also located in northern Britain (see Ross *et al.* 2016). These investigations also suggest the use of oats at Bamburgh for both human and animal consumption.

9. RECOMMENDATIONS FOR FUTURE RESEARCH

In future, radiocarbon dating of the seeds within the kiln would be useful, given that the stratigraphic dating suggests a 9th- to 11th-century range and even broader ranges were provided by the archaeomagnetic (Young 2016, pers. comm.; Clelland and Batt 2008). In addition, further analysis on the wild species at Bamburgh, in reference to their soil preferences and climatic tolerances, may be useful in determining the growing locations of the crops found at the fortress (e.g. Stevens 2011, 98; Coutu 2007).

The eventual integration of archaeobotanical data with studies on the zooarchaeological evidence and human skeletal remains from the Bowl Hole, including isotope studies, would make for a very interesting and well-rounded approach to understanding diet and health at Bamburgh Castle (see Groves 2013, 470-471; Groves *et al.* 2013).

10. APPENDIX

“Bumpy” c.f. Seaweed



Sample 365, Context 3249, Trench 3



Sample 369, Context 3248, Trench 3



Sample 411, Context 3419, Trench 3

“Smooth” c.f. Seaweed



Sample 369, Context 3248, Trench 3



Sample 369, Context 3248, Trench 3

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